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(Assisted by several Scientific Gentlemen.)

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No. CCLXV.

RECENT PATENTS.

To John Walker Wilkins, *of Hampstead, electric telegraph engineer, for improvements in electric telegraphs, and in the instruments used in connection therewith.*—[Sealed 13th January, 1853.]

This invention consists, first, in arranging telegraphic apparatus, worked by electro or other magnets, or by electricity, however developed, in such manner as to give motion to a marker or tracer, and thereby to impress, mark, or otherwise render visible, in a continuous line, upon a suitable recording surface, arbitrary characters or signs, each composed of two, three, five, or more lines, in different positions, representing letters, words, or figures, and connected in an unbroken line throughout the length of the paper or other material used as the recording surface; which surface is kept moving under the marker or tracer, by means of clock-work or other suitable apparatus, whilst the characters and signs, representing letters, words, and figures, are being marked or otherwise produced thereon.

In Plate I., figs. 1, and 2, represent, in plan and elevation, an arrangement for giving motion to a marker or tracer, so as to produce characters or signs on a moving recording surface. 1, 1, 2, 2, are electro-magnets, having an armature *a*, mounted between their opposing poles. *h*, is an arm or lever, fixed at one end to the armature, and moving with it when the armature is caused to vibrate between the poles of the magnets. The arm or lever *h*, has a tracer *l*, fixed to its free end; and this tracer is caused, by means of a spring or other-

wise, to be in contact with and press against the paper or other material used for receiving the impression; and it is by the movement of the armature *a*, conveyed to the arm or lever *h*, and, consequently, to the marker or tracer *l*, which is in contact with the recording surface, together with the movement of such surface, that the peculiar form of the characters or signs is obtained. The electro-magnets 1, 1, 2, 2, are formed, in the usual way, by winding insulated wire round a soft iron core; and the coils composing the magnets are connected in pairs by the pieces *m*, *m*, of soft iron, which again are connected by the cross piece *g*: this cross piece serves as part of the magnets, and also to hold the pair of magnets in their relative positions. The armature *a*, may be either a permanent or electro-magnet, or composed of soft iron. It may also be employed as the marker or tracer without the intervention of other apparatus; but it is preferred to have a marker attached. When a current of electricity, however obtained, is made to pass through the coils of the magnets 1, 1, the wire of which is wound so that the extremities *d*, *c*, of the iron cores shall, when magnetized, be of opposite polarities,—the armature *a*, whether a permanent magnet or soft iron, will be deflected on its centre *q*; that is to say, if a permanent or electro-magnet, it will be attracted, at each end, by its presenting contrary poles to those made in the electro-magnet 1, 1; or, if of soft iron, the movement will be similar. By this deflection or motion of the armature *a*, the extremity of the arm *h*, will be moved in the direction of the arrow *o*, and held in that position so long as the same current is passing in the same direction through the coils of the electro-magnet 1, 1. In a similar manner, when the current of electricity is passed through the coils of the magnet 2, 2, the extremity of the arm *h*, will also be moved, but in the opposite direction, or in that of the arrow *n*, and will be held there so long as the current is passing. A like result would be produced if the armature *a*, were a magnet or electro-magnet, and both magnets 1, 1, 2, 2, were used at the same time: in such case it would only be necessary to arrange the wire on them—so that while one of the magnets used was attracting, the other would be repelling the armature; the reverse being the case on reversing the current of electricity.

The method adopted in this arrangement of producing signs and characters from the motion of the armature is, by causing the recording surface to pass between the marker *l*, fixed on the end of the arm *h*, and a roller or other surface *k*, shewn at fig. 2, which surface being inked, the ink will be transferred

to the paper or other material used, by a simple pressure of the arm and marker; or a pencil, pen, or other point may be attached to the arm *h*, so as to mark directly on the paper or material used. The recording surface is preferred to be in the form of a narrow slip or strip of paper, which is caused to move between the tracer *l*, and the roller *k*, by means of clockwork, arranged so as to give motion to a receiving drum on which the paper is wound, and by which it is drawn at any required speed—passing under the tracer in its course. As the marker or tracer is always pressed into contact with the travelling slip of paper, a continuous straight line will be produced on it when the magnets 1, 1, 2, 2, are not in action; but when a current of electricity is sent through either of the electro-magnets 1, 1, 2, 2, and the marker is caused to move to one side or the other, a corresponding diversion or deviation of the drawn line will take place; and after such deviating line, and as long as the current continues to pass through the electro-magnet, a straight line will be produced in a direction parallel to the original straight line before mentioned: when the current is broken, the armature and marker will return to their former position; the marker being all the time in contact with the paper, and thus producing a continuous line. By reversing the current of electricity, the marker will be moved aside in the opposite direction, and lines will be produced deviating from the normal straight line in the contrary direction to those before produced. By combining two, three, five, or more of the marks, thus produced, in different positions, signs or characters will be obtained, which may be the representatives of letters, figures, or words. Any set of signs that the operators may find most suitable may be employed to represent the alphabet and cardinal numbers; and combinations of lines may be also adopted to indicate words of frequent occurrence.

For the purpose of sending positive and negative currents of electricity upon lines of telegraph, to work one or more of these telegraphic instruments, such as described, in the same electric circuit, the arrangement of keyboard, shewn in figs. 3, 4, and 5, is employed. By tracing the course of the current as it would flow from the positive and negative poles of a galvanic battery, or other source of electricity, when either of the keys *e*, e^1, are pressed down, it will be seen that a current of electricity will be sent in a given direction through one wire, say the down-line wire, and at the same time it will return through the up-line wire; and the direction of such current will be reversed on depressing the other key, and releasing that which

had been previously depressed; so that to send a positive current alternately through the same wire, in different directions, it is only necessary to press down the keys *e*, e^1, alternately, and make contact with the brass stops *d*, d^1. Thus, when the key *e*, figs. 3, and 4, is pressed down, so as to make contact between the metal *f*, and the metal *d*, the screw *k*, at the end of the lever *f*, *h*, will raise the spring *a*, and break its contact with the pin *b*, at the point *m*; and when this is done, while the negative current of electricity is passing through the spring c^1, to the metallic lever *f*, and thence to *d*, and through a conductor *d*, *b*, fig. 5, to the down-line wire, the other current will be passing through the spring *j*, to *h*, and through the screw *k*, and spring *a*, to the bracket *c*, and thence through the spring a^1, and pin b^1, to the up-line wire. So also, when the key e^1, is pressed down so as to make contact with the stop d^1, the one current will pass along the up-line wire, while the other current will follow the down-line wire. By means of this arrangement or keyboard, which can be acted upon, if required, by magnets, instead of by hand, batteries or other sources of electric power may be brought into action so as to work other circuits; that is to say, the first keyboard of the series may be worked by manual operation, and then, through the intervention of electro or other magnets, another similar keyboard or keyboards may be worked, which will in turn work other circuits, and so on *ad infinitum*.

For the purpose of facilitating the working of the recording apparatus, above described, the patentee, as well as employing the keyboards, uses an arrangement of apparatus termed the "automatum repeater." This instrument, in one telegraph circuit, is used for the purpose of bringing into operation currents of electricity to work telegraphs or telegraph circuits, whether short or long, or other instruments, or other extended circuits working or connecting other telegraphs; which telegraphs or extended circuits can be made to work other automatum repeaters to any extent and through any distance. The automatum repeater is represented in fig. 6. *w*, *a*, *w* is an electro-magnet; *a*, representing the iron core, and *w*, *w*, the wire coiled on it. *b*, *b*, are fixed, permanent, or electro-magnets, and *b**, *b**, pendent continuations of such magnets, formed of soft iron, or steel, or other metal magnetizible by induction, or otherwise; and moveable at the pivots or hinges *c*, *c*, placed so as to be very near the poles of the magnet *w*, *a*, *w*. Now, if a current of electricity be sent, by means of the keyboard last described, through the magnet *w*, *a*, *w*, by pressing one of the keys described, and completing the circuit through

a galvanic battery or magneto-electrical machine, the core *a*, will be rendered magnetic with opposite poles; and if the magnets have been so magnetized that the pendent poles *b**, *b**, are like poles, that is, both positive or both negative, then one of them will be attracted to the iron core *a*, and the other repelled from it. In order to attract that pendent pole which was before repelled, and to repel that which was attracted before, it is only necessary to reverse the current of electricity through the wire *w*, *w*, and the iron core *a*, becomes magnetized in a reverse direction; whence, the pendent poles *b**, *b**, remaining the same, it follows that the pole which was before attracted will now be repelled, and *vice versâ*. This alternate motion of the moveable parts *b**, *b**, of the magnets is employed to bring into operation galvanic or other electric power, so arranged that upon causing one of the pendent or moveable poles of the magnets to come in contact with another portion of the apparatus (as shewn at the extremities of the core *a*, of the magnet *w*, *a*, *w*,) a circuit is completed, which may be employed to work other circuits, and other instruments, and also to work the magnets of the recording instrument first hereinbefore described.

Another part of this invention has relation to the insulating of exposed or overground telegraph conductors or wires. It may be observed that overground conductors have heretofore been insulated for the most part by masses of insulating substances, and some have been made with a capping of zinc or other material, to protect from the conducting effect of rain; but these modes of insulating have not effectually answered the purpose intended. It is well known that in dry situations an exposed conductor is well insulated by a thin coating of any good insulating substance at the point of suspension or contact; but, in damp and wet weather, this small surface of insulating substance would be easily wetted over, and the electricity would escape from the wire through the water, and thence, if connected by more water, as on a wet post, to the ground. Now the object of this improved mode of insulating is to remedy this disadvantage; and to this end the insulation is effected with that quantity of insulating substance only which is absolutely required in fine dry situations; and connection or escape of the electricity by water is guarded against by increasing the length of surface between the point of suspension and the outside of the conductor. In constructing these insulators, a core of wood is made, or any other substance not of necessity an insulator (since iron would answer the purpose), around which is placed,

outside each other, one, two, three, or more tubes of glass, metal, or other material, with a space intervening between each, so as to form chambers round the core, up and down the sides of which electricity must travel to connect the point of suspension of the wire with the exterior. The wire is suspended from the core by a hook,—the hook being insulated from the core by a coating of gutta-percha or other non-conductor; and, as a finish, the whole of the insulator is dipped in a solution of any non-conducting substance, so as to leave a thin coating over all. Figs, 7, 8, 9, and 10, are sections of different constructions of insulators. *a, a, a,* are the cores; *b, b, b,* are tubes of glass or other material, surrounding the cores; and *c, c, c,* are the suspending-hooks. In fig. 9, the hook, from which the wire is suspended, fastens the insulator to the arm *d,* of the post on which it is supported.

The patentee claims, First,—the arrangement of electric telegraph apparatus in such manner as to give motion to a marker or tracer held continuously in contact with a moving recording surface, and thereby to mark or produce upon such surface, characters or signs indicating letters, words, or figures, and connected together in a continuous line. Secondly,—moveable terminations to fixed magnets, for the purposes hereinbefore described. Thirdly,—the construction of electric telegraph insulators with tubes of glass or other material, arranged concentrically around the core, from which the electric conductor is suspended, and having spaces between them so as to form an extended non-conducting surface between the point of suspension of the conductor and the connection of the insulator with its support, as hereinbefore described.

To Edwin Pugh, *of Whitstable, in the county of Kent, draper, for improvements in the means of ballasting ships or vessels, and in rendering them buoyant under certain circumstances.*—[Sealed 31st January, 1853.]

The object of this invention is to diminish the labor of charging ships with ballast and discharging the same. In carrying out this invention the patentee divides the hold of the ship into several compartments of moderate dimensions; in each of which he places a water-tight vessel, which may be supplied with water when the ship requires ballast. Each of these vessels is to be furnished with a cock for letting out air from the vessels, and an opening for admitting the water. When it is required to discharge the ballast, the water is to be

let out of the vessels and pumped out of the ship, and, if required, air may be allowed to supply its place. This will increase the buoyancy of the ship, and may therefore be found exceedingly convenient under certain circumstances. The object of placing the water vessels in compartments is to prevent them from being shifted by the motion of the ship.

In Plate I., fig. 1, is a plan or sectional view of part of a vessel fitted with the improved water ballast,—the section being taken in the line A, B, of fig. 2, which is a transverse vertical section taken in the line C, D, of fig. 1. Fig. 3, is a longitudinal vertical section taken in the line E, F, of fig, 1. The water-vessels *a, a, a,* may be of any convenient number. In the figures, four are represented,—two of which are placed on each side of the keelson. They are composed of canvas, coated inside and out with gutta-percha, caoutchouc, or other suitable waterproof material; and are formed to fit the shape of the ship, as shewn best in the sectional view fig. 2, and the enlarged detached view fig. 5. These vessels are secured from shifting laterally by the longitudinal partitions *b, b,* which are supported in a vertical position and kept in their places by the vertical grooved bars *c, c, c,* one of which is shewn detached at fig. 4. The bars *c,* are firmly fixed to the timbers of the ship, by screwing into a socket made therein, as shewn in fig. 3. At their upper end, pins *c**, are screwed in; and over these pins passes an eyelet-hole *a**, attached to a band, which passes around the water-vessels *a, a,* as shewn in the enlarged detached view fig. 5. Each of the water-vessels is provided with a man-hole *d,* for the purpose of obtaining access to the interior when required. These man-holes are secured in any convenient manner, and are closed by plates, into which are screwed short pipes *e,* furnished with taps or cocks for admitting air when required. Water is admitted to the vessels *a, a,* through pipes *f, f,* communicating with a supply-pipe *g,* and provided with suitable stop-cocks for cutting off the communication when desired. The main-pipe *g,* communicates with a pump or valve-apparatus for admitting the water. This apparatus, which is shewn detached, on an enlarged scale, at figs. 6, and 7, consists of a barrel *h,* connected, at its upper end, to the pipe *g,* and closed at its lower end by a plate or valve *i,* on the screw-shaft *j,*—the upper end of which passes through a screw-box *k,* and is provided with a winch or handle, whereby it may be turned. It will now be understood that, on turning the handle of the screw-shaft *j,* the plate or valve *i,* will be lowered from its seat, and the external water will rise in the barrel *h,* and pass

from thence along the pipes *g*, and *f*, into the water-vessels *a*, until it fills the same,—care being taken to open the air-pipes *e*, of the man-holes *d*, to allow the air, contained in the vessels, to escape. To prevent the water-vessels from rising in their compartments, they are held down by transverse battens *l*, *l*, and longitudinal battens *l**, *l**, through the ends and other parts of which the pins *c**, of the grooved bars *c*, pass, and are held down in their places by keys or the screw stanchions *m*, *m*. These screw stanchions extend from the under side of the deck-beams to the pins *c**, and their lower ends are made hollow to receive the pins *c**.

When it is required to lighten the ship, a cock, on a pipe connected with the water-vessels, must be opened, and the water allowed to flow into the well of the ship, from which it is pumped by the ordinary ship's pumps. Air may, at the same time, be forced into the vessels *a*, *a*, by a suitable force-pump; by which means the water will be more readily expelled therefrom, and the vessels will become inflated with air, and the ship be thereby rendered more buoyant. Or, when the water ballast is pumped out, the flexible vessels *a*, *a*, may be removed, if preferred, and cargo stowed in their place. The water-vessels, when inflated with air, may be removed from the lower part of the ship and secured to any other part, in order to assist in floating the vessel. The bulk-heads, which enclose the ends of the water-vessels, are supported by iron stanchions or diagonal bracings *n*, *n*, which are secured to the flooring at one end, and to the bulk-head at the other end.

It will, of course, be understood that, if required, the battens may be covered over with a moveable flooring, so that cargo may be stowed away thereon, which may be easily done without inconvenience or interfering with the improved water ballast,—it being only necessary to provide easy access to the pipes or cocks, whereby water or air is admitted or expelled from the vessels *a*, *a*.

The patentee claims the employment of water-tight vessels, made to fit the internal form of the ship, and placed in compartments, and secured by battens or other similar contrivances, for the purpose of preventing such water-tight vessels from moving or shifting. He also claims the method shewn, or any mere modification thereof, for securing the said vessels in their compartments; and likewise the construction of the apparatus for filling the said vessels with water.

To Alfred Vincent Newton, *of the Office for Patents, 66, Chancery-lanc, mechanical draughtsman, for improvements in steam-boilers, and in the mode of supplying the same with water,—being a communication.*—[Sealed 12th April, 1853.]

This invention is intended, firstly, to protect the fire-plates of the furnaces of locomotive steam-boilers against the intense heat of the burning fuel, and consists in isolating the lower portion of the water-space, surrounding the furnace, from the rest of the boiler, and in connecting it with the water-tank by a pipe, or other channel, in such manner that a constant and free communication will be maintained between the tank and the isolated water-space, whereby the fire-plates will be kept cool by the circulation of water in the water-spaee; and the heat abstracted by the water from the plates will be rendered available for the generation of steam.

The locomotive and tender, reprcsented in partial sectional elevation in Plate I., are similar in their general external features to those in common use,—the boiler *a*, being of the tubular variety, and surmounted by a steam-dome *b*, over the fire-box *c*.

The invention relates, secondly, to a mode of effecting a more perfect combustion of the fuel than heretofore; and, for this purpose, a second combustion-chamber is provided, into which a current of air is injected, which, mingling with the inflammable gases of combustion, will facilitate their burning. Into this second combustion-chamber, which is shewn at *d*, the ordinary tubular flues of the boiler run, and it is supplied with a current of air through an opening *e*, in its bottom. The chamber *d*, is connected with the fire-box or principal combustion-chamber *c*, by a short tapering flue *f*. The fire-box is surrounded by a water-space *g*, in the usual manner; but the lower portion g^1, of this space, is separated from the upper portion by a diaphragm or partition-plate *i*, placed a foot, more or less, above the top of the grate-bars. The lower portion g^1, of the water-space, separated from the rest of the boiler, is connected by a pipe *h*, with the water-tank *k*, of the tender, which keeps it full of comparatively cool water that protects the inner or fire-plates of this part of the boiler from the intense heat of the burning fuel adjacent to them. In order that the heat abstracted from the fire-plates of the boiler by the water thus supplied from the tank, may be rendered available in the generation of steam, this part of the water-space is connected with the suction-pipe *m*, of the

pump which feeds the boiler, and which draws the heated water out of the space g^1, to allow of its replacement by cooler water from the tank—to be, in its turn, heated and passed through the pump into the boiler. To permit of the coolest water being left in contact with the fire-plates, and of the hottest being pumped into the boiler, the supply-pipe *h*, from the tank *k*, enters near the bottom; while the discharge-pipe *m*, of the pump communicates with the top of the space g^1. The water may be either sucked or forced through this space. By this arrangement the fire-plates are not only kept cool, while the engine is in motion, but also when the engine is standing still, by the free circulation which will take place between the tank and the water-space g^1, through the pipe *h*. As there is comparatively little pressure in the lower or isolated part of the water-space, stay-bolts are not required to strengthen it; and, consequently, the fire-plates will present a smooth surface and uniformity of thickness, which will greatly retard their burning out.

The patentee claims, First,—isolating the lower portion of the water-space surrounding the furnace from the upper portion thereof, and connecting it with the tank of feed-water in such manner that the water will circulate in contact with the fire-plates to cool them, and be itself heated preparatory to being pumped into the boiler. And, Secondly,—the general arrangement of the parts, hereinbefore described, for generating steam in locomotive boilers.

To JOSEPH CHARLES FREDERICK BARON DE KLEINSORGEN, *of Little New-street, for an improved apparatus for indicating the variation of the magnetic needle.*—[Sealed 26th October, 1852.]

THIS invention consists in ascertaining the variation of the magnetic needle from the true north on every part of the globe.

In Plate I., fig. 1, is a front view of the apparatus; fig. 2, is a section, shewing the internal structure; fig. 3, represents the fixed card for correcting the variation; and fig. 4. is the indicator, to be placed on the fixed card. The apparatus is constructed in the form of a compass, hanging in the arc *n, n*, which is suspended in the frame *o, o*,—giving it an oscillatory movement each way; while another horizontal central movement is produced by means of the axis *p*. *a, a*, and a^1, a^1, are two glass cylinders, arranged one within the other, and

fixed in their corresponding mountings *i, i*, and *k, k*, in such a manner as to leave an empty space between the glass cylinders *a*, and a^1. *c, c*, is a common compass-card, which, with the needle fastened on it, moves on the point *s*. On the ring *i, i*, another corresponding ring *l, l*, is screwed, which also contains a glass cylinder *b, b*; at the upper end of which there is fastened a fourth brass ring *q, q*, by which the instrument is attached to the arc *n, n*, by the screws *v, v*. *e*, is a lens, the mounting *f, f*, of which forms the lid of the upper cylinder; *r, r*, is a brass bottom, which separates the two cylinders; and *d, d*, is a second brass bottom, with an immoveable compass-card, but without a needle fastened on it. The bottom *d, d*, is fastened by means of a screw *m*, as also the axis *t*, on which the registers *g*, and g^1, turn. The indicator, shewn at fig. 4, has, at one end, a hinge, which is put into the groove *u*, on the upper ring *q, q*, of the cylinder *b, b*. (see fig. 1.)

The method hitherto pursued, for finding the variation, has been to start from the magnetic north in the north pole itself; but, by this invention, an invariable absolute point—that is to say, the south pole, is used to indicate the north. The operation of the instrument is as follows:—On the outside of the compass, from the ring *q, q*, to the ring *k, k*, there is a straight vertical line in the middle of the arrow *w*. Exactly in the same direction with this line is the north pole of the permanent compass-card *d, d*; and, by commencing the operation, which must always be done at mid-day exactly, the compass must be turned, in such a manner, as to have the north pole of the compass-card *c, c*, corresponding with the said line exactly. If the sky is favorable, the lid *f, f*, with the lens *e*, may be taken off, as they will not, in that case, be required for the operation; and the end of the needle is put into the hole *v*; so that the needle lies horizontally across the glass cylinder *b, b*, exactly in the direction of the north and south pole of the compass-card *d, d*.

With the instruments usually employed for the purpose of ascertaining the direction of the north and south pole the exact noon-time is found; and the moment at which this takes place, it must be observed whether the shadow of the needle falls exactly on the south pole of the card *d, d*. If this is the case, the magnetic needle is right; but, if the shadow falls either towards the east or the west, the body of the instrument must be turned round on its vertical axis until the shadow falls exactly on the south pole of the card *d, d*; in which case the easterly or westerly variation amounts to as

many degrees as the difference between the north pole of the needle and the point of the vertical arrow *w*, on the outside of the box. Should the sun be obscured, and no well-defined shadow be obtained, the lens must be employed in order to concentrate its rays. The registers *g*, g^1, form compartments, into which small slips of parchment are put, with the variation found under any meridian written on them, thus serving as a convenient reference for the navigator; but the instrument can be made without these registers, if desired. The space left between the two glass cylinders *a*, *a*, and a^1, a^1, is to prevent the local attraction of the needle in so far as it is necessary for common use; and, if desired, a still higher degree of insulation can be established. The instrument can, if desired, be brought in connection with the steering compass, and may also be provided with a pedestal for hydrographical, topographical, land, and other surveying operations.

The patentee claims, Firstly,—the improved apparatus for finding the variation of the magnetic needle from the north by means of the south pole. Secondly,—the finding of this variation even when the sun is obscured. Thirdly,—the horizontal central movement of the compass.

To LAMBERT ADOLPHE BEAUVAIS, *of Upper Charlotte-street, Fitzroy-square, for improvements in machinery for obtaining wool, silk, and fibres from fabrics, and rendering them suitable to be again employed.*—[Sealed 19th April, 1853.]

THIS invention relates to the employment of a novel arrangement of machinery for separating the fibres of woollen or other rags. The machinery consists, principally, of a large round tub or other vessel, provided, at bottom, with teeth, rasps, or notches, so as to render the surface uneven or rough. In this tub (which may be moveable or fixed) rotates a frame, which carries other roughened surfaces or rasps, that are also made to act on the rags placed in the tub; which is supplied with certain chemical ingredients, such as soda, carbonate of soda, potash, lime, and oil or grease. These matters are mixed together, combined with a suitable quantity of water, and maintained at a temperature of from 90° to 100° Fahr., by means of a jet or jets of steam, which will materially assist in cleaning the wool, and also in separating the fibres, and softening and improving the quality of the fibre obtained by the process.

The figure in Plate II., represents the apparatus in ver-

tical section. *a*, is a tub or vessel, through the middle of which passes a vertical axis *i*, that may either turn round with the tub *a*, or be fixed to two cross pieces or traversers *j*, fixed at the lower part of the apparatus. These traversers *j*, are secured to the four posts or standards *k*, and therefore form part of the framing. A ledge or shelf *h*, *h*, secured to the upright standards *k*, *k*, carries antifriction rollers *l*, *l*; upon which an iron circle *b*, *b*, placed under and secured to the bottom of the tub *a*, is made to rest. On the under side of the bottom of the tub or vessel *a*, *a*, is also fixed a bevilled toothed wheel *m*, *m*, whereby motion is transmitted to the tub *a*, from the wheel u^1. The bottom of the tub is furnished with a rasp, having more or less strong notches, as shewn in the drawing. Two other rasps, blades, or roughened surfaces *u*, are carried by a frame *o*, which may be made to rise and fall in the tub *a*, by means of a screw *p*, which passes through a screw-box *q*, *q*, mounted in guides *s*, *s*, which are connected, in any convenient way, to the fixed framing. It will now be understood, that by turning this screw *p*, the two rasps *u*, *u*, may be raised up from the notches or roughened surface of the bottom of the tub *a*, when required.

Motion is communicated to the several parts through the horizontal shaft *n*, on which are mounted a fast and loose pulley *v*, *v*. This shaft is furnished with two wheels u^1, and u^2, the former of which (u^1,) gears into the wheel *m*, fixed under the tub *a*, and transmits thereto a circular motion: while the latter (u^2,) gears into a similar wheel *x*, at the lower extremity of the vertical shaft x^1. At its upper part the shaft x^1, carries a pulley *y*, from which motion is communicated by means of an endless strap or band, or by suitable gearing, to the pulley *z*, fixed on the hollow shaft *w*, which receives the upper end of the vertical shaft *i*, before mentioned. To this hollow shaft *w*, is connected the frame *o*, which carries the rasps *u*, *u*. By means of this arrangement of parts it will be perceived, that if motion is transmitted to the tub *a*, so as to make it rotate to the right, the rasps *u*, will turn to the left, and *vice versâ;* which will be found convenient for creating a proper current for dissolving the chemical ingredients, and, at the same time, cleansing the rags and fibres.

The patentee claims the combination of the tub or vessel *a*, with the rotating frame or rasps or notched surfaces *u*, *u*; and also the employment, with the machine or apparatus above described, of the mixture of chemical ingredients above set forth.

To William Wilkinson, *of Nottingham, frame-work knitter, for an improvement or improvements in ropes, cords, lines, twines, and mill bandings.*—[Sealed 15th April, 1853.]

This invention consists in the introduction of a metallic wire into the middle or axis of the threads of hemp or other fibrous substance, of which ropes, cords, lines, twines, and mill bandings are made. The use of iron wire is preferred in carrying this invention into effect, but wires of other metals may under some circumstances be preferable. For example, where great flexibility is required, copper may be employed; and where there is risk of exposure to water, tinned iron wire, or wire of a metal less readily oxidizable than iron, should be employed. In carrying his invention into effect, the patentee ordinarily uses iron wire, the diameter of which varies with the properties required in the rope, cord, line, twine, or mill banding to be produced. In making threads he proceeds as follows:—One end of the wire is attached to the whirl or rotating axis used in rope making, and by it a rotatory motion is communicated to the hemp as it is spun out by the workman, or a rotatory motion is communicated to the said wire in any other convenient manner. The other end of the wire is attached to a swivel, and the wire is stretched in a nearly horizontal line between the whirl and swivel; the wire being supported at suitable intervals, in the same manner as the threads in the ordinary manufacture of rope are usually supported. A rapid rotatory motion is communicated by the whirl to the wire; but the wire suffers no permanent twisting, for the rotatory motion communicated by the whirl is transmitted to the other end of the wire attached to the swivel: the wire is thus put into rapid rotatory motion throughout its whole length. The workman connects the hemp, with which he is provided, as in the ordinary manufacture of threads, with the whirl, or the end of the wire connected therewith, before the rotation of the whirl and wire is commenced, and he recedes from the whirl, spinning out the hemp, with which he is provided, exactly as in the ordinary manufacture; excepting that the rotating wire is under his left arm (or his right, as the case may be), and he delivers the said hemp on the said rotating wire. Having made a number of threads, each containing a straight metallic wire in its axis, the threads are combined together to form "strands," and the strands are combined together to form ropes, cords, lines, twines, and mill bandings, exactly as threads of the ordinary manufacture are combined into

strands, and the strands into ropes, cords, lines, twines, and mill bandings.

The patentee claims the introduction of a metallic wire into the threads of which the strands of ropes, cords, lines, twines, and mill bandings are composed.

To William Edwards Staite, *of Manchester, Gent., for improvements in apparatus for producing and applying current electricity; parts of which apparatus are applicable for obtaining and treating certain chemical products resulting from electrolytic action.*—[Sealed 14th March, 1853.]

This invention consists, firstly, of certain improvements in electric lamps, one of which is an improvement in the construction of that description of electric lamp in which the distance between the points of the electrodes is adjusted by means of an electro-magnetic regulator, and in which the electro-magnet of the regulator is actuated by the current of electricity which circulates through the coil of the magnet and the electrodes of the lamp, for the purpose of causing the electrodes to be maintained at the required distance apart, and thus ensuring a continuous light.

In lieu of the over-balance weight, which has been used to elevate the lower electrode, a spirit or water float is substituted, and, instead of the ratchet and click, which have been used in the construction of such a regulator, a friction clip, in some cases, is employed.

In Plate II., fig. 1, is a sectional elevation of an electric lamp, with these improvements attached thereto. A, is a tube, say of metal, filled with spirit or water; but oil or any other fluid may be used. Within this tube, and fitted so as to move up and down easily, is a float *b, b,* either made of tin plate soldered together air-tight, or made of wood or any other light material suitable for the purpose. Attached to this float is the rod *b,* the upper end of which is introduced into the tube C, containing the lower electrode, at the bottom part; and the weighting of the float is so regulated that its tendency to rise in the fluid in which it is immersed shall cause the lower electrode to be very slowly pushed up, and only as fast as it is consumed. The electrode tube may be of any length, so as to contain a supply of carbon for many hours, or even days; and the length of the rod *b,* and the float tube A, must of course be in proportion to the length of the electrode tube;

that is, if 24 inches, for example, of electrode be employed, the float must have a rise of 24 inches, carrying with it the rod *b*. D, is the electro-magnetic regulator: it consists of a helix of insulated wire wound tightly round a metal reel, in the centre of which reel is a hollow cylinder of annealed iron, capable of free motion up and down within it. This iron cylinder is (when the lamp is in action) made into a powerful electro-magnet by the passage of the electric current through the coil, and when the lamp is not in action the cylinder is elevated by a spiral spring or other suitable contrivance, placed beneath it, to the extent allowed by a stop, placed so as to fix the desired limit to this motion of the cylinder. As the distance between the points of the electrodes varies when the lamp is in action, the quantity of electricity passing through the coil will also vary, but in an inverse ratio; and the power of the electro-magnet will vary in a direct ratio, according to the quantity of the electricity passing through the coil. Thus, when the points of the electrodes approach nearer towards each other, the quantity of electricity passing through the coil and the electrodes will be increased, and the power of the magnet to draw down the lower electrode will also be increased; and when the distance between the points of the electrodes is increased, the diminution in the quantity of electricity passing through the coil will cause a diminution of the power of the magnet, and of the extent to which it can draw down the lower electrode.

Instead of the ratchet and click *f*, *f*, a friction clip may be attached at the top to the electro-magnet, which, as the electro-magnet is pulled down by its attraction towards the centre of the coil, clasps the rod *b*, and holds it firmly to the magnet; so that it cannot ascend until such a diminution in the power of the magnet is produced as shall allow it to rise to a position at which the clip is detached from the ratchet: when this takes place, the lower electrode, by means of the float and rod, will be raised, until the upper end of it is placed at the striking or proper distance from the upper electrode, necessary for producing the light.

Between the two electrodes E, and G, at the points *m*, is a guide, consisting of flexible springs of metal, through which the lower electrode is pushed, as previously described. This guide is fitted loosely on to the tube, holding the electrode, and has a free play up and down (say one-sixteenth of an inch), so that the friction clip, without being released from its hold on the rod *b*, when pulled down by the magnet, enables the electrode guide, with the electrode it embraces, to

place the lower moveable electrode at the required distance from the fixed upper electrode.

The second improvement in electric lamps consists in using a cylinder of glass with a metallic ventilating top plate or ventilating glass shade, in lieu of the closed glass shade hitherto employed in electric lamps.

K, K, are brass feather-edged pillars, to be insulated in any convenient manner from the other parts of the lamp; and L, is a metal plate having slots so as to fit in the top of K, K, after the manner of a bayonet joint. Into the plate L, the top electrode is fixed in any convenient manner, and the plate L, is furnished with a piece of metal sliding over an aperture in the plate, after the manner of a ventilator. By a small opening of the ventilator, the gaseous and other matters resulting from the ignition of the carbon are allowed to escape, and the glass cylinder O, surrounding the light, is kept comparatively unsullied and clean. The mode of connecting the battery to this improved lamp, and the mode of insulating the regulator and the electrodes, differ in no respect from other electric lamps, and they need not therefore be here described.

Fig. 2, shews in partial sectional elevation the working parts of an electric lamp having the electrodes placed horizontally. A, A, is a frame or stand, preferred to be of metal; O, represents the ventilating cylinder or glass shade, with the mode of fixing the negative electrode; K, K, being the feather-edged pillars, and L, the metal plate, as described in fig. 1. C, is a metal tube containing the positive electrode, and slotted underneath to allow a driver *d*, having a projecting eye *e*, to traverse the same; and by means of the cord *f*, running over a pulley, and having attached to it a weight *g*, the said weight will actuate the driver *d*, and force the electrode through the tube C, as fast as the same is consumed. The mode of regulating the descent of the weight *g*, is by an electro-magnet in all respects similar to that described in fig. 1, having either a ratchet or click connected therewith, or a friction clip, as before described. *m*, is a small weight, also attached to the driver *d*; so that when the electro-magnet is drawn down by the power of the electric current, the ratchet or rod *n*, being attached to the weight *g*, by a cord running over a pulley *p*, as shewn, elevates the weight *g*, and allows the weight *m*, to come into play and to draw back the driver *d*, and the electrode attached thereto, and thus separate the positive from the negative electrode to the required distance to maintain a steady light. The weight *g*, may be used in a tube filled with oil, water, or spirit, to give it a more steady motion; and the

ratchet or rod *n*, may also have the tubes *s*, *s*, above and below the coil through which it passes, as guides to the same, and which tubes may be fitted by brackets, or in any other suitable manner, to the frame A, A.

Thirdly, this invention consists of an improvement in the preparation of carbon, or compounds of carbon, which are used to form the electrodes of electric lamps, or the negative plates of galvanic batteries, or other articles made of carbon or carbonaceous material, which are used for electrical purposes; the chief object of such preparation being to improve the quality and the power of such articles. These articles, after having been moulded to the shape required, and baked or dried, are boiled in oil until the air is expelled from the pores, and they have become thoroughly saturated with the oil. If the plates do not exceed half an inch in thickness, an hour's boiling will generally suffice to effect this purpose. The articles thus saturated are then to be baked in any convenient crucible or other closed vessel at a white heat, until the whole of the oil shall have been converted into carbon of high conductibility, which will be in from eight to twelve hours; and if the baking be continued for some time, say about two hours after the carbonization has been completed, the conducting power of the carbonaceous mass will be improved. Articles made of that description of graphite known as gas retort carbon, are treated as follows:—The articles are submitted for twelve or more hours to the action of nitro-muriatic acid, slightly diluted; after which they are boiled in any suitable alkaline solution; the same being changed from time to time until the whole of the acid absorbed has been neutralized; they are then again washed in pure water, to extract all the soluble matters remaining in them, and, when thoroughly dry, are boiled in oil, and baked, as before described. Fat or tallow may be used in lieu of oil, but oil is preferred.

This invention consists, fourthly, of an improvement in the mode of effecting the connection of plates, slabs, cylinders, or any other articles made of carbon or other carbonaceous material, and used for electrical purposes, with metallic conductors or pieces of metal, for the purpose of producing and maintaining more perfect contact between the surfaces of the carbon or carbonaceous material and metallic substance used. In consequence of the porous nature of carbon, the metallic conductors to which the negative plates of carbon are attached will generally, when immersed in the acid in the cell of a galvanic battery, permit the acid to act upon the metal in contact with the carbon, and thus produce an oxidation more or less

rapid, and so cause a film of non-conducting matter to be formed between the metal and the carbon; and whenever copper or any other easily oxidized metal is used to form such a conductor, the result is a great loss of power. The mode employed to prevent this inconvenience and to maintain a more perfect contact, is as follows:—The tops of the carbon plates are perforated with holes, say $\frac{1}{8}$ inch in diameter, and the carbon, having been slightly heated, so as not to chill the melted metal, is placed in a suitable mould, and metal is poured in a melted state into the mould, so as to cover or enclose the carbon plate over the top, and, for half an inch or more, down the sides and ends, according to the size of the plate: a metallic jacket is thus formed, which is held firmly to the carbon by the metal which has run into and filled up the perforations in the plate. The carbon, with its metallic jacket, is then removed from the mould, and a soldering iron will (when necessary) complete any deficiencies in the perfect contact between the metal and the carbon. A metallic strip, say of copper, or of flexible metallic cord, or of wire, may be attached, without soldering, by casting the end of it into the metal jacket in the mould. Lead, or an alloy of lead, may be used advantageously for this purpose, because it is less liable to oxidation, and therefore better adapted to hold good for long periods. The metallic jacket may then be varnished; but to paint it with ordinary red lead of commerce is preferable. Double plates of carbon may, with suitable moulds, be thus connected, so as to form double pairs in galvanic batteries; and four or more plates may be used, forming a square of carbon; or a number of carbon strips may be so arranged in a polygonal or other form, and be connected together by one metallic jacket cast in the form of a ring, so as to embrace them all.

Fifthly, this invention consists in the use of wove platinum wire-gauze sheets, to form the negative elements of galvanic batteries, whatever metal—whether zinc, tin, iron, lead, or any combination of these, or any other metals, or combination of metals, may be used—to form the positive elements; the sheets being attached to metallic conductors, by casting upon one edge or top part of each of them a piece or jacket of metal, for which purpose lead or an alloy of lead is preferred, for the reasons before stated. For ordinary galvanic purposes these wire-gauze sheets should be about 30 grains to the square inch: it can, however, be made of a much finer description, if necessary. Upon one edge or top part of each of these platinum gauze sheets a piece or jacket of lead or other metal is cast (as

above described with reference to carbon plates) so as to form a jacket or covering over a sufficient portion of the edge or top part of the sheet of gauze, to ensure strength and good contact.

Sixthly, this invention consists of an improved form of cell (made by preference of glass), to be used in galvanic batteries in the manner hereinafter explained. The form of the cell may be either round, square, or oblong, having a tube made with or attached thereto at bottom, for collecting the precipitate formed by electrolytic action of the elements employed. Fig. 3, represents one of the cells with tube and channel attached. A, is the cell, for containing the positive and negative elements, and the exciting solution; and B, is the tube attached thereto.

These cells, when used in forming a compound battery, are fitted loosely side by side into a vessel or vessels, preferred to be of glass or earthenware. At the bottom of such vessel is flatly laid and cemented a stout sheet of vulcanized India-rubber: melted sulphur will answer very well as a cement for this in most cases. The cells are so fitted to a frame that they can be simultaneously raised and lowered,—say one or more inches. The mode of charging the cells is (they being raised, say one inch simultaneously) to fill the said outer vessel with the exciting fluid, and allow it to ascend into the glass cells until they are nearly full: the frame-work carrying the cells is then lowered, and the end of the tubes, pressing on the vulcanized India-rubber bottom, closes the tube, and prevents any circulation of the electric power other than through the regular circuit. To discharge the said cells simultaneously, they are lifted up as before, and the outer vessel, and consequently the cells, may then be discharged into any convenient receiver. Such cells may be furnished with valves, or any other means of discharge which may be found more convenient; or a flexible tube of vulcanized India-rubber may be attached to the bottom of the said tube, and the other end of the flexible tube attached to a nozzle, which nozzle communicates with a channel or vessel, which may be made sufficiently long to extend to any number of cells in series; and by elevating the channel, with the tubes attached to the top level of the cells, the whole of the cells may be charged or discharged simultaneously.

The seventh head of this invention has relation to the chemical products resulting from electrolytic action, and consists in using alloys of lead to form the positive elements of galvanic batteries. In forming such alloys, the lead is mixed with metals, which, in an electrical sense, are more positive than it, or which, when combined with lead, render the compound metal

more active as a voltaic generator. These alloyed lead plates may be cast in moulds like ordinary lead plates. The metals preferred to be used for alloying the lead are antimony, zinc, or tin. In practice, an energetic action is found to result from an alloy of lead and antimony in the proportion of 4 parts of antimony to 16 parts of lead, or 2 parts of zinc to 18 parts of lead, or 2 parts of tin to 18 parts of lead; but by increasing these quantities of antimony, zinc, or tin, respectively, or, in some cases, by combining these metals for the purpose of alloying the lead, a slight addition of either one to the mass renders the compound plate cast from it more active still. The exciting solution preferred is dilute nitric acid, say in the proportion of 1 part of acid to 2 parts of water. The metals composing the electro-positive plates are oxydized; and where tin is employed with lead the result is as follows:—Part of the lead is precipitated, and part held in solution as nitrate of lead,—the tin being deposited as an oxide. The precipitate may then be separated from the solution by allowing it to settle; and the solution of nitrate of lead may then be treated in any of the ways well known to chemists; either for the production of crystals of nitrate of lead; or the solution may be neutralized by adding to the same either carbonate of potash or carbonate of soda,—in which case the lead in solution is precipitated as a carbonate; leaving in solution nitrate of potash, or nitrate of soda, as the case may be. This solution may be evaporated down, and the products used for any of the purposes well known to chemists. The precipitates, consisting of the carbonate of lead and oxide of tin, are said, when mixed, to yield a most valuable white pigment, which, when treated in any of the ways well known to chemists, will produce colored pigments also of great value.

And lastly, this invention consists of an instrument or apparatus to be used with galvanic batteries, and which instrument is called a "tell-tale." In fig. 4, D, represents the electro-magnetic regulator previously described, to the iron cylinder of which is attached a rod *e*, connected with the dial-face of one of the inventor's previously patented galvanometers, which indicates in units and degrees the force of the electric current. F, and G, are two alarums, furnished, one with a small bell, the other with a larger bell: these alarums may be constructed in the ordinary way, worked by a train of wheels with suitable escapements, and actuated either by springs or weights, and having oscillating or other strikers to strike the bells. *f*, *f*[1], are two jointed levers, so arranged that by lateral movement an escapement in either alarum or

both may be set free, and the bell or bells be struck. The mode of actuating the said levers is as follows:—When the electro-magnet is in the position shewn at fig. 4, both escapements are prevented from going off, by the levers being retained in a vertical position; the end of the said levers at the top being so contrived as to hold the escapements in their places, so that no movement of the wheel work takes place, and the bells remain quiescent.

This is the position of the magnet when the electric light is in full and steady action. If the power of the electric current diminishes, then the magnetic iron cylinder will rise, by means of the weight *m*, and the friction wheel *o*, in the rod *e*, will impinge on the pallet *r*, and cause the rod f^1, to be pushed aside; whereby the escapement will be released, and the small bell in the alarum G, will be struck. If the power should diminish still further, then the magnet will rise still higher, and, in addition to moving aside the lever f^1, will impinge against the pallet *s*, on the other lever *f*, and the large bell will be struck. If the power cease altogether, the friction wheel *o*, impinging on the pallet *s*, and on the pallet *t*, will set both bells going simultaneously. By this instrument, placed in any convenient part of the circuit, say in an electric lighthouse in the light-keeper's room, combined with a dial-faced galvanometer, shewing the amount of current power, audible indications will be given of every change in the circuit: for instance, when the electrodes in the lamp require automatic adjustment, the electro-magnet in the tell-tale rises a short distance, and by this means, as described, causes the small bell to be struck once. As long, therefore, as this small bell continues to be heard at intervals, everything in the circuit is going on well; should, however, any changes take place requiring the attention of the light-keeper, then the electro-magnet rises still further, and causes the larger bell to be struck, as described. When the circuit is broken altogether, from any cause, then both bells continue ringing until the power of the springs or weights actuating the alarums shall have been expended, or until stopped. This portion of the invention may be easily attached to any of the electric lamps themselves, as described; and the one electro-magnet which is common to them all may be made to perform the double purpose of actuating the electrodes and working the escapements of the alarum. Further, as the said electro-magnet changes its position, it may be made to release an escapement, in the ordinary manner employed in electric bells; which escapement, being attached to a train of wheel-work moved either

by a spring or weight, and furnished with an oscillating or other suitable striker, as the said escapement is released, will cause the striker placed within the bell to give two or more strokes to the bell at every change,—a convenient mode of working a fog bell in connection with electric lighthouses.

The patentee claims, First,—the application of a float for elevating the moveable electrode of an electric lamp; also the friction clip for connecting the electro-magnet of an electro-magnetic regulator with the rod passing through it; and also the application of a ventilating glass shade to an electric lamp, as hereinbefore described. Secondly,—the mode of treating and preparing carbons or carbonaceous compounds for electrical purposes, by saturating them with oily or fatty matters, and baking them in manner hereinbefore described. Thirdly,—the mode or modes of connecting articles made of carbon or carbonaceous compounds with metals, for the purpose of producing and maintaining a more perfect contact between them, as hereinbefore described. Fourthly,—the use of sheets of platinum gauze to form the electro negative elements, having metallic conductors attached thereto, as hereinbefore described. Fifthly,—the construction of the cells of galvanic batteries with tubes at or attached to their bottoms, combined with the means whereby the same are charged and discharged, in manner hereinbefore described. Sixthly,—the employment of plates, composed of lead alloyed with other metals more positive than lead, as positive elements in galvanic batteries, with any suitable solution, as above described. And Lastly,—the electric tell-tale or alarum, as hereinbefore described.

To Auguste *and* Jean Le Roy *and* Eugène Pavy, *all of South-street, Finsbury, manufacturers, for improvements in the production of lace and other fabrics.*—[Sealed 26th April, 1853.]

This invention consists in the application of certain textile plants, either alone or in combination with other known fibrous substances, for the manufacture of various fabrics.

The textile plants employed are the yeuca gloriosa, the pine, jute, and the dwarf palm, either separately or combined together, or mixed with cotton, wool, flax, hemp, or silk. With these fabrics the warp or weft of tissues, and also the bodies of gimp, fringe, and other like fabrics, are formed.

The textile plants are treated by known chemical or mechanical means for the extraction of the fibres, which are

bleached, if required, and put alone, or together with other fibrous materials, upon the ordinary hand or Jacquard loom. The fabrics may be dyed or printed by known processes, according to their intended application. They are applicable, with advantage, on account of their strength and low price, to the manufacture of clothing for men and women, and of gimp, fringe, and other similar fabrics; of bed furniture, curtains, coverings for chairs, and other similar articles of furniture; carpets, horse and waggon-cloths; for which purposes they may be used in place of fibrous materials hitherto employed, of a much higher price.

The patentees claim the application of the fibrous plants hereinbefore enumerated, either alone or combined with other fibrous substances, for the manufacture of various fabrics, as hereinbefore described.

To HESKETH HUGHES, *of Cottage-place, City-road, manufacturer, and* WILLIAM THOMAS DENHAM, *of the same place, manufacturer, for improvements in machinery for weaving.*—[Sealed 7th May, 1853.]

THIS invention consists in weaving fabrics by means of circular machinery, in which the reeds are arranged in sections round a circle, the upper surfaces of which are formed into a circular guide or tramway, on which the bobbin traverses for carrying the weft-thread or threads (when more than one bobbin or shuttle is used). The bobbins are caused to revolve by the rising of the reeds, through the intervention of suitable cams or friction-rollers attached to the centre shaft of the machine. The outer ends of the reeds are centred upon a wire or pin attached to the general framework of the machine. The warp-threads are caused to cross and recross one another, so as to open the sheds for the passage of the shuttle or shuttles, by being passed through heddle eyes pierced through levers, which levers are acted upon by suitable cams or friction-rollers attached to the main shaft.

In Plate II., fig. 1, is a partial sectional elevation of so much of a circular loom as is necessary to explain the invention. A, is the central shaft, the lower end of which turns in the step B, upon the base-plate C. D, is a bent-lever, one end of which is centred in the ring E, which surrounds the main shaft. The upper ends of these levers are connected by the pin *a*, to a second series of bent levers F, which are held by a wire or pin passed through the slot *b*, and supported by the ring G. H, is the heddle eye, pierced through the lever F, there being one

heddle eye for each lever in the circle; I, are the warp-threads, which are wound round the warp bobbins K, and after passing between the tension rollers L, are passed through the heddle eyes and carried up to the disc M, round which the work is formed.

N, is a friction roller, centred upon the spindle *c*, attached to the main shaft, and revolving with it. O, are the reeds centred upon the pin or wire *d*, attached to the general framework of the machine. These reeds have cut in them a groove or notch, which forms a tramway for the passage of the shuttle carrier and shuttle. The shuttle carrier is composed of a small plate *f*, having friction wheels *g*, in each end, which traverse in the notches in the reeds O; *h*, is the shuttle upon which the weft-threads are wound, and which is itself supported and turns in brackets upon the plate *f*. P, is a friction-roller revolving upon the spindle *i*, attached to the main shaft A, which, as it rotates, lifts the reeds so as to form an inclined plane, and thereby the shuttle is made to advance and lay the weft-thread between the warp sheds. The action of this machine is as follows:—Upon motion being given to the central shaft by means of the bevil-wheel Q, geared into by the pinion R, on the shaft S, driven by a crank-handle, the friction wheels are caused to revolve; and by means of the wheel N, acting upon the levers D, and through them upon the levers F, they are alternately thrust outwards,—carrying with them the warp-threads. Upon the levers D, being released from the roller N, a helical spring U, which is attached at one end to a projecting pin upon the end of the levers F, and at the other end to the general framework, causes the levers F, to be drawn back towards the centre of the machine, and so to cross the warp-threads and admit of the shuttle passing between and laying the weft to form the fabric. The levers D, may, if desired, be arranged in sections, so that upon the passage of the friction-roller N, they are alternately thrust forward and drawn towards the centre, whereby the warp-threads are caused to cross and recross each other for the passage of the shuttle.

Fig. 2, represents a similar section of a modification of a circular loom, in which the reeds O, are dispensed with, and the inclination of the levers F, is reversed; the shuttle being supported in notches or grooves cut in the ends of the levers F, and caused to revolve by the crossing and recrossing of the levers behind the shuttle. W, W, are the cams attached to the main central shaft, and revolving with it, for causing the levers to cross and recross each other, for opening the warp sheds for the passage of the shuttle. I, I, are warp-threads, which are

wound round the warp bobbins K, and, after passing between the tension rollers, are passed through heddle eyes *a, a,* in the levers F, by which the threads are carried up to the disc M, where the work is produced.

The shuttle N, has at top a small friction-roller *n,* cut with a groove around its periphery, which serves to lay the weft-thread, and at the same time to act as the ordinary reed in pressing the work. The lower end of the shuttle has also a friction-roller, which runs in a groove formed in the levers F, so as to form an abutment for the friction-roller *n.* The disc M, is caused to rise as the work is produced, by any of the ordinary methods employed in the circular knitting frames

The patentees claim the general arrangements of machinery or apparatus for weaving warp and weft fabrics, as hereinbefore described; and also causing the shuttle or shuttles carrying the weft-thread or threads to revolve by the action of the reeds O, in fig 1, or by the crossing and recrossing of the levers D, in fig. 2, as hereinbefore described.

To GREGORY KANE, *of the City of Dublin, camp furniture manufacturer, for the construction of portable houses, or portions thereof, out of parts which may be used for other purposes.*—[Sealed 10th May, 1853.]

THIS invention relates to the construction of the main parts of portable houses out of materials or parts which have served, beforehand, the purpose of containing merchandise, or articles required in the construction or furnishing such houses, or to be used therein, or other articles which it may be convenient to carry abroad.

The invention consists, firstly, in forming and constructing the materials or parts, out of which the houses are to be made, in such a manner as to admit of their being used as packing-cases when suitably put together, and eventually opened out or taken to pieces, and re-arranged to form the main parts of portable houses; secondly, in converting such materials or parts into habitable dwellings, by re-constructing them on a suitable foundation, and combining with them such parts as may be found desirable, in order to render them complete and commodious.

In carrying into effect the first part of this invention, the several portions required to form the top, bottom, and sides of the packing-case are united, by means of hinges, clamps, or other suitable modes of fastening; and the dimensions of

such portions are regulated according to the sizes of the parts of the house into which they are to be converted. Some of the cases may be made with double sides, or false bottoms, to receive the window-sashes or frames; and this would be the more necessary when it is intended to furnish the parts required to construct a portable house with a shop front.

The patentee remarks, that a house containing a parlour or living-room, 14 feet by 10, a bed-room 10 feet by 10, and a kitchen 5 feet by 5, with a porch, might have its walls made out of eight cases, of 6 feet 4 inches in length, by 2 feet 6 inches in width and depth; but he does not confine himself to the number or size of cases to be used in the construction of a house. And, in converting such cases into houses or parts of houses, a plinth or base of strong scantling, grooved throughout on the top edge, is placed on the ground for the purpose of receiving the lower part of the walls of the house, which are to consist of the cases opened out. The joists that are to support the floor are then laid down and connected together by hinges: a foundation or base being thus prepared, the end wall of the house, consisting of the top and bottom, and two sides of one case opened out, is fixed in its place in the groove intended to receive it. The dimensions of this wall will be 10 feet in width and 6 feet 4 inches in height. The opposite end wall may be formed in a similar manner. The front of the house being 24 feet, two similar walls may be placed in the groove of the plinth at right angles to the end walls, and fixed to them at the angle formed by the walls coming together by means of iron knees. By this arrangement there will be an opening of 4 feet for the entrance, to which may be adapted a porch, constructed out of two sides of one open case. Thus there will have been consumed one case for each of the end walls, and one for each of the front walls, with half a case for the porch; making four cases and a half. Then the two back walls may be placed in their grooves, and fixed, in like manner, to the front walls, leaving an opening or space of 4 feet, which may form the entrance-way into the kitchen. Thus six cases and a half will have been used, and one and a half will be left to form the remaining three sides of the kitchen, which is 5 feet square.

The floors may be formed out of the ends of cases, such as those above described, which will be in squares of 2 feet 6 inches each; and these may be screwed or otherwise suitably fastened to the joists; or the floors may be composed of pieces of different sizes. The roof may be formed of any waterproof tent-covering, or of metal, or other suitable material;

and a chimney, with flues into it, may be constructed of metal. The doors may be made to slide in grooves formed in the strong foundation-pieces, and the windows may be hung in grooves or casings formed in suitable spaces in the walls. These spaces for windows are made in one side of several of the boxes previous to their being completed: for a house of the size described four windows will be found desirable,—two in the bed-room and two in the living-room; these would be 2 feet 6 inches in height by 15 inches in width. Until the packing-cases arrive at their destination, each space is fitted with a panel, which can be afterwards used as a shutter when the sash is hung in its place.

The patentee claims, First,—the formation and construction of packing-cases in such a manner as to admit of their being afterwards converted into the main parts of portable houses. And, Secondly,—the construction of such houses out of such parts raised upon a foundation-frame, and combined with suitable portions of detail required to make them habitable and commodious, as described.

To THOMAS PAPE, *of Loughborough, in the county of Leicester, glove manufacturer, for improvements in circular frames, and in the fabrics and articles produced thereon.* —[Sealed 7th January, 1853.]

THIS invention consists in a novel construction of circular looms or frames, for the manufacture of drawers, stockings, gloves, and other classes of hosiery, whereby the needles, presser-bar, aud other appendages to circular looms, of the old construction, are dispensed with; and, as a substitute therefor, hooks, so constructed and arranged as to allow of their turning over when pressing off the work, are employed. Instead of the ordinary loop-wheel a wheel, with grooves cut round it, is used; in which are placed levers or blades, having nibs formed upon their front ends, similar to the ordinary sinker; which levers take the thread from off the bobbins, and lay it between the hooks when forming the loop.

In Plate II., fig. 1, represents one of the improved hooks, which are arranged around a circle of brass or other suitable metal; but, instead of being cast in leads, and fixed as in the ordinary needle-bar, they are passed through holes, which allow of their being turned half round when pressing off the work, in the manner hereinafter explained. *a*, is the stem of the hook, which is turned over at the end *b*, and so forms

a small hook or barb. The stem is flattened at the part *c*, and twisted into the form of a screw, as indicated; so that, when acted upon by means of the lever represented in figs. 2, and 3, it is caused to make a half turn, and thus permits the work to be pressed off. These levers have cut in their lower ends a small notch *d*, which fits over the screwed portions of the stem of the hook, and are arranged one to each hook. The levers are centred at *b*, to a ring, which surrounds the circle carrying the hooks, and is concentric with it. In order to give to these levers their requisite motion upon the screwed portion of the stem of the hook, a projecting piece or cam, which bears upon the upper part of the levers, is affixed to the frame-work of the machine; so that when the levers and hooks revolve, their notched ends are caused to slide along the screwed part of the hooks, which causes them to make a half turn, or to turn over. To restore the hooks to their former position, after the work has been pressed off, a similar cam or projecting piece is employed, which bears upon the lower part of the levers, and causes them to slide in the reverse direction on the stem of the hooks, and prepares them for again receiving the thread to form a fresh loop. Instead of using these forms of levers, the patentee sometimes employs saddles (one to each hook), as represented in figs. 4, and 5, arranged and working in a similar manner, and for the purposes before explained. Fig. 6, represents a side view of an arrangement to be used instead of the ordinary loop-wheel. *a*, is a conical wheel, having a series of grooves around its surface, in lines corresponding to the axis on which it revolves. In these are placed a corresponding number of levers or blades, similar to that represented in fig. 7; which blades are centered at *a*, in the grooves of the wheel (fig. 6,), and are raised and lowered by means of cams, which bear upon the short ends, so as to insert and withdraw the nibs *b*, of the blades into and from the hooks when forming the loop. These levers or blades have formed upon them two nibs, as shewn in fig. 7; the first of which is to hold the thread, while the second is to bring forward the fabric to produce new work. The hooks, by means of the levers (figs. 2, and 3,), turn over on the thread being placed between them, and reverse their position as soon as the work is pressed over. In order to press back the work, previous to forming a fresh row of loops, a wheel or cam may be fixed to the frame-work, in the ordinary manner.

For the manufacture of narrowed or fashioned goods on the circular frame, in which the requisite shape is given to

the fabric for forming gloves, stockings, drawers, and other classes of fabrics, without a seam, the hooks, on which the loop is formed, are arranged around an expanding and contracting rim,—such expansion and contraction being regulated by means of the thread of a screw cut upon a rim which surrounds the rim carrying the hooks, both of which are formed with an opening to admit of such expansion and contraction. The outer and screwed rim is made slightly conical, and takes into the thread of a screw cut on the inside of a third and exterior conical rim, which forms the frame-work of the machine. The hooks at those parts of the expanding and contracting rim, which form the opening, are hinged upon a wire, so that they may be placed in or out of action, according to the extent that it is required to fashion.

The patentee claims, First,—the several arrangements and combinations of apparatus in the formation of circular frames or looms of hooks, levers, or saddles, loop-wheel, and levers or blades, all as hereinbefore described. Secondly,—the fashioning of gloves, stockings, drawers, and other fabrics, by means of expanding and contracting rims or frames, arranged and constructed in the manner hereinbefore described. And, Thirdly,—the manufacturing of gloves, stockings, drawers, and such other articles, either fashioned or straight, and without a seam, by means of the arrangements and combinations of apparatuses hereinbefore described.

To RICHARD PROSSER, *of Birmingham, civil engineer, for improvements in the construction of printing rollers, used in machines for printing calicoes and other substances.*— [Sealed 5th February, 1853.]

THIS invention consists in the employment of a hoop or cylinder of iron or other metal, conical inside and outside, interposed between the copper (or other metal) printing cylinder (on which the pattern to be printed is engraved) and the ordinary wrought iron conical printing mandril, so as to form one combined printing roller, to be used in machines for printing calicoes and other substances.

In Plate II., fig. 1, is an elevation of the parts forming a complete roller; fig. 2, is an end view, and fig. 3, is a section of the same, shewing the parts on a larger scale. *a*, is the mandril, which revolves in bearings in the printing machine in the ordinary way; *b*, the elastic iron hoop, formed conical inside and outside, by means of which the copper or other

engraved cylinder is firmly fixed to the printing mandril in the following manner:—The engraved cylinder *c*, which is, say, one-tenth of an inch thick, is passed over the conical hoop *b*, which may be easily done, because the cylinder *c*, is conical inside: the large end is then to be passed over the small end of the conical elastic hoop *b*, and placed thereon in the required position. The conical mandril *a*, is then forced into the conical elastic hoop or cylinder *b*, and, by expanding the same, the engraved cylinder *c*, the elastic conical hoop *b*, and the mandril *a*, become firmly united together. The key or feather *d*, prevents the elastic hoop *b*, turning on the mandril *a*; and the small key or feather *e*, prevents the engraved cylinder *c*, turning round on the elastic hoop *b*. The hoop *b*, is made elastic by cutting a groove the entire length of the hoop, and through its entire thickness.

The engraved cylinder *c*, has been described as being conical inside, but it may be parallel inside, in which case the elastic hoop *b*, must also be parallel outside; but it is preferred to make them conical, because the thin engraved cylinder can be more easily taken off the elastic hoop, and another placed thereon.

To James Newall, *of Bury, in the county of Lancaster, railway carriage builder, for improvements in brakes, machinery, or apparatus applied to railway and other carriages in motion, and in the mode or method of connecting two or more of such brakes together.*—[Sealed 3rd December, 1852.]

This invention relates to improvements in the mode of applying brakes to the wheels of carriages in motion, when it is necessary to stop or retard their progress or velocity. This new arrangement of brakes is self-acting, so far as not requiring the power or assistance of an attendant to attach or apply the brake-blocks to the wheels,—it being only requisite to release a catch for that purpose, and to turn a wheel or screw, or raise a lever, or some similar contrivance, to detach them before the wheels are set in motion. This plan is applicable to work the usual slide-brake now in general use on railway carriages, or it may be applied to any other kind of brakes. The only improvement claimed in the construction of the brake itself, is to make all the joints conical, so that, as any of them become slack or loose by wear and friction, they can be tightened, and thus prevent the severe wear and tear, by the derangement of the several parts, when one joint becomes

loose. It is also applicable to applying brakes to carriages on railways or on common roads, and to one, two, or more wheels of the same carriage: it may be applied to one carriage only, or, by a mechanical contrivance, hereafter explained, to any reasonable number of carriages, so connected as to enable one man to detach or work them with perfect ease and safety. This improved plan is so far self-acting, that if a portion of a train should become detached, whilst ascending an incline, the separation itself will cause the brakes to apply their power to the wheels of the detached carriages, although there should be no person in charge of them, and thus prevent danger of collisions, by stopping or retarding their velocity, which would otherwise be fearful down an incline. The common slide-brake to one carriage is worked as follows:—A lever is attached to the centre shaft of the brake; such lever extending to or a little beyond the end of the carriage: this lever acts upon the brake-shaft, so that, when it is lifted up, it detaches the brake-blocks from the wheels; and when it is allowed to fall down, it forces the blocks to the wheels by its own weight or gravity. As the power of this lever will depend upon its length, and the force or power acted upon its extreme point, by fixing a weight on the end of it, and allowing it to fall, the force or power of the blocks against the periphery of the wheels will be in proportion to the length of the lever, and the weight attached to it. The action of the brake is thus so far self-acting as only to require a power to lift the lever and weight, and to keep the blocks off the wheels.

In order to raise the lever, a conical spiral spring, enclosed in a cylinder, is used instead of the weight already described; and, as it is evident that either means will answer the same end, it will only be necessary to explain the method of working the lever by the power of the spring. To the end of the lever a vertical rod is attached, extending about half way up the end of the carriage: to this end, a cylinder, containing one or more conical springs, is fixed; and to which is attached the vertical rods. At the bottom of the cylinder, and under the spring, a small cross-pin or bar, provided with projecting arms, is fitted, to slide in grooves in the cylinder; so that, as the small cross-bar is drawn upwards, the spring is compressed, and the vertical rod, thus drawn up, lifts the lever and draws off the blocks from the wheels: but when the spring is not compressed, it exerts its force against the lever, and forces the blocks against the wheels; thus exerting a power similar to the weight before described. To give the

guard or brakesman the necessary control over this apparatus, another vertical rod is attached to the projecting arms of the small cross-bar, and continued to the top or roof of the carriage. To the top end of this vertical rod two racks are attached, which work into a wheel supported by bearings on the carriage roof. When the man in charge turns this wheel he raises the rack, and, consequently, the vertical rod attached to the projecting arms of the cross-bar; thus compressing the spring and raising the lever, as already described. A simple ratchet is provided to keep the rack and rod in their positions, when raised to keep the blocks off the wheels; and by releasing the ratchet and catch, the rack, vertical rod, and lever, fall and complete the self-acting motion aforesaid: the double rack, as already mentioned, is for the purpose of reversing the action when the carriage is turned, or its position reversed.

The method of forming or completing a continuous connection of the said power or apparatus, so as to act upon a number of carriages simultaneously, is next described, and consists in mounting a horizontal shaft, either tubular or solid, and lined with vulcanized India-rubber, or some similar soft elastic material, in bearings, on the top of each carriage. One end of the shaft passes through the wheel which acts upon the double rack already described; so that, when the wheel is turned, it both raises the rack and turns, or partially turns, the horizontal shaft at the same time. About the middle of each of the shafts a square expanding slide or socket is made, so that, as the train elongates or contracts by the action of the buffer-rods, the shafts will accommodate themselves to the varying distances between each carriage; and, in order that the connecting-shafts may also accommodate themselves to the different heights of carriages, and to give way when the train is travelling on curves, that part of the shaft which projects over or beyond the ends of the carriage is made with strong flexible universal joints, so that this part of the horizontal connecting-shaft may either hang down over the end of the carriage, or be slidden back out of the way when not connected to the shaft of another carriage. These peculiar joints are commonly known as ball-and-socket joints; but, instead of the usual loose ball-and-socket, the joints may be bolted through at right angles, so that they will give way in every direction, and accommodate themselves to the necessary requirements, as already stated. In order to connect these flexible parts of the connecting-shaft with ease and the necessary safety, reversing couplers are used, with spring-catches and safety-screws; so that the connection

is instantly made by inserting the end of the shaft into the socket of the coupler, and, by its reversing motion, it can be inserted into the socket of another coupler,—thus forming the connection in any position of the carriages. The connecting-shafts, in fig. 1, are represented as being placed along the tops of the carriages; but it is evident that they can be worked either at the sides, underneath, inside the carriages or vans, or, in fact, in any convenient position; as it is only necessary for the man in charge of the brakes to turn, or partially turn, one end of the connecting-shaft; and, by means of the connections already described, he will give motion to all the shafts at the same time; and, by raising all the racks and compressing all the springs by the same power or contrivance, he will lift all the levers, and thus detach all the brakes; and, by dropping the catch into the ratchet-wheel, they will be held in that position; and, by releasing the said ratchet and catch, all the brake-blocks will be applied to the wheels instantly. This apparatus may also be fixed on the tender, so that it may be worked by the engine-driver or stoker, and be applied to waggons or luggage-trains as well as carriages. It will also be understood by any person conversant with practical mechanism, that this continuous connection may be applied to work a signal between one part of a train and another, by causing it to strike a bell, sound a whistle, shut off the steam, or work any other contrivance for effecting the said object of giving a signal when necessary.

In Plate II., fig. 1, is a side elevation of a railway carriage, shewing the connecting-shaft, with the apparatus in gear, and, consequently, the brake-blocks off the wheels; and fig. 2, is an end elevation of the same, shewing the action of the spring and the connections of the vertical rod with the horizontal shaft. *a*, represents the lever acting on the central shaft of the brake, and applying the four blocks to the wheels; *b*, *b*, the pipe-nuts for adjusting the blocks to the wheels; *c*, the cylinder containing the spiral spring; *d*, the double rack, with connecting links acting on the lever; *e*, the cross pin, which acts on the spiral spring; *f*, and *f**, a wheel and pinion for raising the rack and compressing the spring; *g*, the horizontal shaft, with expanding slide about the centre; *h*, the flexible points; and *i*, the reversing coupler, with spring-catch and safety-screw. Fig. 3, shews a mode of working a signal between one part of a train and another, by causing it to strike a bell.

The patentee claims, Firstly,—the method of working the brakes of carriages, whether the same be on railways or common roads, and of making them partially self-acting, by the

power of a conical spiral spring or springs, or weight or weights, acting on a vertical rod or rods, and communicating with a lever acting on the centre shaft of the brake. And, Secondly,—the method of connecting two or more of such apparatuses together, by means of horizontal shafts along each carriage, with expanding slides, flexible joints, reversing couplers, with spring-catches and safety-screws, as herein described and illustrated.

To William Frederick Thomas, *of Porchester-terrace, Bayswater, in the county of Middlesex, for improvements in apparatus for sewing or stitching.*—[Sealed 27th April, 1853.]

These improvements relate to that class of sewing or stitching machinery where two threads are used, one of which is conducted by a needle, the other by a shuttle or other thread carrier, and where the two threads interloop together to obtain the required sewing or stitching.

In Plate I., figs. 1, and 2, shew respectively the two sides of the machine: fig. 3, is a plan; fig. 4, is a sectional end view; figs. 5, 6, are modifications of parts of the apparatus, and figs. 7, and 8, are detail views of the shuttle and shuttle-race.

a, a, is the framing of the machine; and *b,* is the main axis upon which are affixed the various cams for giving the different motions. Upon the axis *b,* is affixed the fly-wheel b^1, to assist the motion thereof; and there is a handle b^2, by which rotary motion may be given to the axis *b,*—or such motion may be given from a steam-engine or other power, by a gut or band acting upon the pulley b^3, affixed to the fly-wheel b^1. *c,* is the needle for conducting the thread through the fabric affixed by a set screw c^1, to the plate c^2, which is capable of moving up and down between the fixed guides a^2, by means of the lever c^3, one end of which is slotted to receive the pin c^4, at the upper end of the plate c^2, whilst the other end carries a pin c^5, with a roller which works in the groove formed in the cam c^6. In order to vary the length of motion of the needle to the length of stitch being produced, the centre of motion of the lever c^3, is formed upon a plate c^7, capable of being moved backwards and forwards along the lever c^3, and set at any required position by means of the set screws c^8. Or a slight variation in the motion of the needle may be obtained by sliding the pin c^5, in the lever c^3, nearer to or farther from the centre of motion of the lever c^3. It is this capability of varying the length of motion of the needle *c,* by

varying the position of the centre of motion of the lever c^3, or by varying the position of the truck or roller at the end of the lever c^3, which constitutes one peculiarity of the invention. d, is the shuttle or instrument for carrying the other thread, which in the working of the apparatus is caused to be interlooped by the thread carried through the fabric by the needle c. The shuttle d, is moved to and fro in its race by the projections e, from the slide e^1, which has motion given to it to drive the shuttle through and through the loop formed by the thread carried by the needle c, by means of the cam e^2, which actuates the lever e^3, as shewn in fig. 1; the lever e^3, being connected to the end of the slide e^1. f, f, are springs applied to the shuttle-race to prevent the shuttle shaking about in its to-and-fro motion. (see fig. 8.)

g, is the instrument by which the work is held correctly in position during the insertion of the needle c; and when that insertion has taken place, and whilst the needle c, is in the fabric, the instrument g, rises off the fabric under question, and moves towards the needle a distance equal to that required to be traversed for the formation of the next stitch, and again holds by pressing on the fabric: the needle c, then rises through the fabric (the thread therefrom having been interlooped by the shuttle thread), and the instrument g, still pressing on the fabric, is caused to slide on the table upon which the work to be operated on is placed—taking with it the fabric being sewn a distance equal to the length of stitch required: and whilst that instrument g, still holds the work, the needle c, again enters the fabric. The under side of the instrument g, is roughened, to facilitate its sliding with it the fabric or material being sewn.

The various movements to the instrument g, are effected in the following manner:—The instrument g, is affixed to the stem g^1, which traverses in the channel formed for that purpose in the frame a, and in addition to the spring g^*, (which tends constantly to keep the instrument g, borne upon the work) it is borne against by the spring g^3. A lifting movement is given to the instrument g, by means of the lever g^4, which turns upon the pin g^5, and at its other end is acted upon by the cam or tappet g^6, affixed on the axis b; and the forward movement is given to the instrument g, to draw forward the fabric for the next stitch by means of the lever g^7, which turns upon the axis g^8, and at the other end carries a screw-stud g^9, which is acted upon by the side surface of the cam g^{10}; and the distance to be traversed for the required stitch is regulated by the distance the screw-stud g^9, projects through the lever g^7. Sometimes the instrument g, is formed in two or more

parts, as shewn by fig. 5, where the part g^{11}, is capable of sliding on the parts g, g^1; the part g^{11}, being constantly borne downwards by the spring g^{12}. The object of thus forming the holding means in two or more parts, is to compensate for any inequalities in the material being sewn; and it is the arranging an instrument g, which, whilst it is the means of holding the fabric or material during the insertion and withdrawal of the needle, is also the means by which the step-by-step movement is given to the fabric for the succession of stitches that constitutes another peculiarity of this invention. A modification of the instrument for holding the fabric to be sewn is shewn at fig. 6; wherein a roller g, (whose surface is preferred to be roughened), is the holding means; and this roller has formed on or affixed to it the toothed wheel h, which is taken into by the spring-stop h^1, so as to hold the roller from turning round when the instrument g, is moved in the direction to move the fabric for the formation of a fresh stitch. The roller g, at such time, acts, by the friction of its surface, to take with it the fabric or other material being sewn; but when the insertion of the needle c, has taken place, as before explained, and the instrument g, moves into position again to move the work, when the needle is withdrawn, the roller or rollers g, turn freely in their bearings. When using the arrangement shewn at fig. 6, the surfaces which press on the fabric do not require to be raised therefrom, but are simply pressed on by the spring g^*; consequently, the only movement required is that given by the lever g^7, to traverse the fabric the length of the stitch; and the lever g^4, and tappet actuating such lever, are omitted. k, is a spring, which at its lower end supports a few bristles to draw the thread out of the way of the needle, when the needle is again entering the work.

Fig. 7, shews one of the shuttles or thread-carriers separately, and another improvement consists in the application to such thread-carriers, used in connection with sewing or stitching-machines, of a wire l, running lengthwise thereof; around which the thread first passes from the bobbin or spool, carried by the shuttle, to the holes in the side of the shuttle, as shewn.

The patentee claims, Firstly,—the means described for regulating the distance traversed by the needle c. Secondly,—the application of springs f, in the shuttle-race, as described. Thirdly,—the so arranging and working the means for holding the fabric, whilst the insertion of the needle is effected, that the same may also effect the requisite traverse of the fabric for the successive stitches, as described. Fourthly,—the application to shuttles used in sewing or stitching-ma-

chines of a wire *l*, as described. And, Fifthly,—the general combination of parts shewn and described, by which the working levers act direct between the cams, and the working instruments or their carriers, and in straight lines, or nearly so.

Scientific Notices.

NEW RULES OF THE PATENT COMMISSIONERS.

THE following set of Rules of the Commissioners of Patents are intended to meet some difficulties which have arisen in the working out of the new Act; and to this end, we believe, they will be effectual. It only now remains to determine what course shall be adopted with respect to the opening of provisional specifications during the existence of the provisional protection; and the new system may then be said to be in full operation.

Third Set of Rules and Regulations under the Act 15 *&* 16 *Vict. c.* 83, *for the passing of Letters Patent for Inventions, and under the Act of the* 16 *&* 17 *Vict. c.* 115.

By the Right Honorable Robert Monsey Lord Cranworth, Lord High Chancellor of Great Britain, The Right Honorable Sir John Romilly, Master of the Rolls, Sir Alexander James Edmund Cockburn, Her Majesty's Attorney-General, and Sir Richard Bethell, Her Majesty's Solicitor-General, being four of the Commissioners of Patents for Inventions, under the said Act of the 15 & 16 Vict. c. 83.

It is ordered as follows:—

Rule VII. of the Second Set of Rules and Regulations of the Commissioners, dated the 15th October, 1852, is hereby rescinded.

I. Every application for letters patent, and every title of invention and provisional specification, must be limited to one invention only; and no provisional protection will be allowed, or warrant granted, where the title or the provisional specification embraces more than one invention.

II. The title of the invention must point out distinctly and specifically the nature and object of the invention.

III. The copy of the specification, or complete specification, directed by the Act 16 & 17 Vict. c. 115, sect. 3, to be left at the office of the Commissioners on filing the specification, or complete specification, shall be written upon sheets of brief or foolscap paper, briefwise, and upon one side only of each sheet. The

extra copy of drawings, if any, left with the same, must be made as heretofore, and according to the directions contained in Rule III. of the Lord Chancellor, dated the 1st of October, 1852.

IV. The copy of the provisional specification to be left at the office of the Commissioners on depositing the same shall be written upon sheets of brief or foolscap paper, briefwise, and upon one side only of each sheet. The extra copy of drawings, if any, left with the same, must be made as heretofore, and according to the directions contained in Rule II. of the Commissioners, dated the 1st October, 1852.

V. All specifications, copies of specifications, provisional specifications, petitions, notices, and other documents left at the office of the Commissioners, and the signatures of the petitioners or agents thereto, must be written in a large and legible hand.

VI. In the case of all petitions for letters patent left at the office of the Commissioners after the 31st day of December, 1853, the notice of the applicant of his intention to proceed for letters patent for his invention shall be left at the office of the Commissioners eight weeks, at the least, before the expiration of the term of provisional protection thereon, and no notice to proceed shall be received unless the same shall have been left in the office eight weeks, at the least, before the expiration of such provisional protection; and the application for the warrant of the law officer and for the letters patent must be made at the office of the Commissioners twelve clear days, at the least, before the expiration of the term of provisional protection, and no warrant or letters patent shall be prepared unless such application shall have been made twelve clear days, at the least, before the expiration of such provisional protection: Provided always, that the Lord Chancellor may, in either of the above cases, upon special circumstances, allow a further extension of time, on being satisfied that the same has become necessary by accident, and not from the neglect or wilful default of the applicant or his agent.

(Signed) CRANWORTH, C.
JOHN ROMILLY, M. R.
A. E. COCKBURN, A. G.
RICHARD BETHELL, S. G.

Dated 12th December, 1853.

INSTITUTION OF CIVIL ENGINEERS.

JAMES MEADOWS RENDEL, ESQ., PRESIDENT, IN THE CHAIR.

November 29th, 1853.

THE discussion on "*Ocean Steamers*" was this evening renewed, when it was contended, that the statement of a supposed wave pressure of 85,000 tons of water, or even of 40,000 tons, to

which it had since been reduced, by a modified estimate, was inadmissible: it would be manifestly impossible for any vessel to withstand such impact from a body of water; and if the position was admitted, it must be evident, that any of the ordinary coasting steamers would constantly be liable to a pressure of 1000 to 1500 tons, which would suffice to utterly destroy them.

The comparison of the qualities for safe riding, when lying-to, between a line-of-battle ship and a privateer, was not to the point, as the former was encumbered by the enormous weight of her armament, and by her top-hamper; in short, the whole misconception had arisen from confounding the wave of oscillation with that of translation; this was exemplified by the case of a disabled vessel: as long as she remained afloat she was comparatively safe, but as soon as she touched the ground, and the wave of oscillation became one of translation, she was immediately knocked to pieces by the impact of the waves.

Next, as to the proportions of 6 to 1, which had been derived from as ancient a type as Noah's ark. Now, as far as was known, that construction had been designed simply to float with a very large cargo; it afforded therefore no analogy for vessels built for speed, however propelled: in fact, modern fast-sailing vessels had abandoned those proportions, which had only been perpetuated by the old tonnage laws, under which merchant vessels were enabled to be constructed, to carry enormous cargoes, but they were unable to attain any considerable speed. It was further argued, that as steam propulsion was employed, the analogy became still less apparent; and, as an instance of the advantage of lengthening ships, the case of the vessels belonging to the North of Europe Steam Navigation Company, was mentioned. The "City of Norwich," 183 feet long, 26 feet beam, 471 tons burthen, and 200 horse-power, could carry, as cargo, 220 head of cattle, at a speed of 10 knots per hour, but she rolled considerably with a beam sea; whilst the "Tonning," 222 feet long, 27 feet beam, 734 tons burthen, and 200 horse-power, carried 360 head of cattle, at a speed of 12 knots per hour: she was a remarkably easy vessel, and had proved her sea-worthy qualities by coming safely round the coast of Scotland during the late gale in September. Thus, with the same engine power, by merely altering the proportions from 7 to 1 to 8 to 1, nearly 60 per cent. more cargo space was obtained, and two knots per hour were gained in speed, with improved sea-going qualities. It was remarked, also, that the relative proportions of the "Tonning" were almost identical with those of the proposed iron vessels for the Eastern Steam Navigation Company.

Taking the "Wave Queen" as an extreme case—her length being 213 feet, with 15 feet beam, and proportions of 13 to 1, with a draught of water of only 5 feet, and comparing her performances with those of the "Christian," a good vessel, about 170 feet long, and with about the proportion of 6 to 1—it was

found, that whilst the latter, in a moderate head-sea, continually shipped the waves, the former, in a similar sea, was perfectly dry. This evidence was given from the personal experience of the speaker.

The "Wave Queen" had since been running between Newhaven and Dieppe, and it was to be expected, indeed it had been predicted, that, from local circumstances connected with the entrance of the harbour at Newhaven, she would meet with some casualty. She was not stranded in consequence of any inefficiency in the power of the rudder, but after a very bad passage across the channel, in the trough of the sea, which was running very high, she arrived off Newhaven, when there was scarcely depth of water over the bar for her to cross; she touched the ground heavily, and hung by her "heel:" a beam sea catching her at the same moment, swung her round and threw her broadside on the beach, where all the passengers were safely landed. It was a good proof of the strength that could be given to iron ships, that though she was thrown broadside on the shore, by the waves of translation, she was got off safely, and brought round to the Thames without material damage.

As to the elaborate calculations entered into with respect to the three great navigation projects,—before admitting the correctness of those results, it must be clearly understood, that the "Rattler," which had been used as the type, was built during the most depressed period (scientifically), of construction, in H. M. dockyard. Her dimensions were 176 feet long by 32 feet 6 in. beam,—a proportion of abont $5\frac{1}{2}$ to 1; and from what had been published, it must have been evident, that she had just performed what might have been anticipated from such proportions. If the calculations of fuel required for long voyages were based upon the old scale of consumption, instead of the present rate, which, in good ships, did not exceed $3\frac{1}{2}$ lbs. per *real* horse-power, the deductions from the calculations must still be more unacceptable.

It was then contended, that all arguments based upon calculations of the speed and other qualities of such a type, must be utterly fallacious. It had been shewn, what increase of speed and of carrying qualities had been produced by lengthening the "Tonning," without increasing her power; and, by analogy, it was only reasonable to presume, that if the proportions of the "Rattler" had been altered from $5\frac{1}{2}$ to 1, to nearly 8 to 1, there would have been a still more striking amelioration; and she would have been a more trustworthy type for the calculations and arguments as to the practicability of constructing, and of commercially working, large ships. It was argued, that with all these, and many other examples to the contrary, it was evidently incorrect to attempt to assume that 6 to 1 was the best proportion for vessels of any kind.

It was assumed, that when it was stated a large steamer was

intended to run to India, or Australia and back, without re-coaling, it was only meant, that she would carry enough coal to avoid detention at the intermediate ports, as (unless it was ascertained that she could not procure a more profitable cargo,) it would evidently be more economical to send coals to the ultimate and distant port by sailing vessels, which would convey them cheaper than she could do.

It must not be supposed that the meeting received for granted the results of calculations based on such a type as the "Rattler," nor that the Institution could pretend to do more than offer a field for the investigation of the scientific portion of the magnificent commercial experiments about to be tried, and for the success of which all must unite in offering their best wishes.

The advantage of employing a smaller number of large ships, rather than a greater number of small ships, for a given trade, especially for long voyages, was shewn by a return, published in the *Liverpool Albion*, of November 21st, from which it appeared that in almost every instance the average is in favor of the largest ships,—the 600-ton ships having an advantage of 24 days, on the average, in 1852, over the 200-ton ships and the 1200-ton ships having an advantage of 22 days over the 600-ton ships. In 1853, also, the results are much the same.

But even with this evidence, it was deemed unwise to rush to the conclusion, that vessels of enormous size would be applicable in all circumstances; in fact, that which determined the expediency of using a large ship was the coincidence of a great amount of traffic and great length of voyage.

It must be evident, that for each length of voyage and description of trade, there was a particular size of vessel that would be most suitable; and, indeed, as in most other engineering works, the circumstances of the traffic would of themselves mainly determine the proportions of the structure: take, for example, the trade between England and America, as originally opened by the "Great Western." That vessel, at first designed, although much the largest ship of her day, was of the smallest size by which such a trade could be conducted; and her length was actually increased, during her construction, to a point then generally considered dangerous,

Since that period, all vessels on that station had been successively augmented in dimensions as the trade increased; but even those vessels were too small for the Australian voyage of 25,000 miles; and the necessity of increasing the length was shewn, by calculating how much coal would require to be carried, beyond that needed for an American voyage, in order to do the Australian or the Indian voyage equally well. Such calculations demonstrated, that a vessel similar to the "Great Western," would require to be lengthened to 520 feet, to accomplish that voyage. This argument shewed, that the conditions of the case compelled the adoption of vessels, of extraordinary length, for steam voyages of extraordinary distance.

Then as to the commercial question: the merchants engaged in the Indian and Australian trade, had calculated, from the data afforded by their own business, what amount of freight and passengers would require accommodation, and it was found, that the quantity was greater than could be received by the ship just calculated. The dimensions, therefore, required to be enlarged, to meet the demand of the existing trade. Thus the traffic itself did actually fix the dimensions of the proposed large class of vessels.

As to the mechanical strength of such vessels, there was no difference of opinion on that point, among engineers, provided the structure was of iron. Ships of wood, on the contrary, were limited in size, by the nature of the material, which was *grown*, and not *manufactured*, and therefore the produce was of limited size; whereas plates of iron could, on the other hand, be rolled of any required dimensions.

Further, as to the resistance of large vessels to waves; it was evident, that the waves of the Atlantic, being of the same size, whether the vessel was small, or large, their proportional magnitude would be decreased, as the size of the vessel was increased; so that the large ship, in a gale, would merely encounter waves of the same proportional size as a ship of half the dimensions in half a gale; and it should be remarked, that the largest ships which had been proposed, were only double the lineal dimensions of existing vessels.

As to the impact of waves upon ships, it should be remembered that a vessel riding on a wave became, virtually, a part of that wave, and moved along with it, as the mass of water, displaced by its bulk, had previously moved. The large Atlantic waves, observed by Dr. Scoresby, did not strike the ship, but made her rise and fall in a gentle oscillation, each of which lasted 16 seconds, a period of too long duration to admit of any approximation to violent collision between bodies.

It was only the small wind waves, or crests, which moved at a different velocity from that of the ship; and the proposed vessels were so much higher out of the water than the observed altitude of these waves, that the decks would probably never be more than wetted by the spray.

It was stated, that a vessel, which, from any fault of construction or from imperfect steering power, was liable to fall off into the trough of the sea, would, in that position, be liable to fearful accidents; and instances were cited of two vessels, of 800 tons and 1,200 tons respectively, being struck by waves which had carried away all the upper works and swept the decks clear. These practical facts were given to shew that the gentle oscillation of heavy waves must be received with some qualification. In answer to this, it was explained, that in a storm there were generally two sets of waves, the long low oscillating wave, and the smaller waves, which were much shorter, rising under the action of the wind. It was these short waves which struck the smaller vessels, with so

much force, when they got on the crest of a large one; but the deck of a very large ship would be too high for such wind waves to break upon it, except as spray.

Returns were presented of the performances of a number of paddle-wheel ocean steamers, for a period of 22 years, tending to prove how greatly the velocity had been increased. This was shewn to have arisen from the augmented size and better build of the vessels, with greater power of engines and other engineering improvements.

As to the question of measurement for tonnage, after discussing the present method, describing that proposed by the Parliamentary Committee, and those by the practical men who had been consulted, the system indicated by the author of the paper was examined with care, and was admitted to possess novel features worthy of consideration, in fixing a legal standard of measurement. It was, however, contended, that for scientific purposes, the displacement to the load line was required; and, for fiscal purposes, it was submitted, that the light and other dues would be more equitably imposed by an *ad valorem* duty on the cargo, rather than on the bulk or form of the vessel.

In winding up the discussion, the dimensions were given of a great raft ship, called the "Baron of Renfrew," which was built at Quebec, in the year 1825, by the late Mr. Charles Wood, of Port Glasgow. Her extreme length was 304 feet; extreme breadth, 61 feet; clear depth, 34 feet; registered tonnage, 5,294½ tons; and cargo of timber, 8,500 tons. The draft of water at the end of the voyage, when water-logged, was 31 feet. She had four masts, and the sails of a 36-gun frigate. Her greatest inclination under press of sail was about 20 degrees. Her greatest speed before she became water-logged, but with 19 feet of water in the hold, was 8½ knots, which was reduced to 6 knots when she was quite full of water. She made the passage from Quebec to the Isle of Wight in 48 days. It was due to Mr. Charles Wood to mention this daring innovation at so early a period.

December 6th, 1853.

The paper read was, "*On the drainage of the district south of the Thames,*" by Mr. J. T. Harrison, M. Inst. C.E.

The district south of the Thames, comprised in the "Surrey and Kent division of the sewerage of the metropolis," was briefly described as extending between Battersea and Greenwich, over an area of upwards of 9 miles in length, with widths varying from ½ mile to 2¼ miles, bounded by the river Thames on the north, east, and west sides, and by the rising ground on the south. Its chief peculiarities were, that the surface was almost entirely below the level of high water mark,—that it was, to a considerable extent formed of alluvial deposit, permeable to, and surcharged with

water, and it was, moreover, subject to frequent flooding from the adjoining high land.

For such a district, the points demanding attention, were shewn to be,—thorough drainage of the land,—means of preventing the inflow of water from the neighbouring high land,—the rapid discharge of the rain water falling upon the area,—and the regular conveyance away of the sewage matter, not only from the houses but from the main sewers.

The present system of drainage was shewn to be very defective; but the author expressed his conviction of the possibility of remedying the existing defects, and of taking advantage of the assistance of the rise and fall of the tide, and of other local circumstances, for thoroughly effecting, both the cleansing of the sewers and the drainage of the district, by means, inexpensive in themselves, and independent of the casualties of steam pumping machinery, or of the caprice of ratepayers.

It was shewn, that the existing sewers acted partly as drains for the land water, but they only extended over a portion of the area, whilst from their being so frequently full, and even being under pressure, the sewage matter escaped from them and saturated the ground;—it was therefore contended, that a system similar to ordinary agricultural drainage should be carried out. The question was incidentally raised for discussion, whether advantage might not be taken of the known rapid filtration of the chalk formation, to facilitate this operation, by sinking several wells, into which the land drains might converge.

The interception of the up-land water, by catch-water drains, was insisted on, and the necessity for it pointed out.

The rain water was proposed to be carried away by the existing sewers, which would require some addition.

The conveyance of the sewage matter from the houses of the district, was next discussed. This was divided into two stages, —the first, from the houses to the public streets, and the second, from the streets to its destination. The means of obtaining the first point were simple, and the stone-ware pipes were recommended as sufficiently good, if of large diameter, and laid properly on a system of separate rather than of combined drainage. For the second point, Greenwich marshes being fixed upon for the temporary reservoirs or recipients of the sewage matter, and the Thames as the ultimate distributor of it, it was proposed to take advantage of the fall of the Thames between Battersea and the Greenwich marshes, which was stated to be 3 feet at the lowest neaps, 5 feet 6 inches as a mean, and 7 feet 6 inches at the highest spring tides; and, by a copious use of Thames water, to flush out the main sewer daily.

This could be accomplished by forming a main sewer, 8 feet in diameter, from Battersea to Greenwich marsh,—having the same fall as the Thames at low-water neap tides; its invert being one foot below low water, and having a communication with the

Thames at each end; so that water from the river might flow through at low water: forming, also, reservoirs for arresting and collecting the sewage, and a canal for receiving the liquid after the filtration or precipitation of the solid matter;—this canal, excavated 6 feet below low water spring tides, extending across the marsh, and being connected with the Thames at each end, with proper gates, &c., so that water from the river might flow through it towards and at low water, and leave it full of pure water, when the gates were shut, on the rising of the tide. The overflow from the reservoir into the canal might be two feet above the highest low-water mark, so as, under the most unfavorable circumstances, to give that depth for the filtered sewage water, and that used for flushing, to accumulate during high water. It was contended, that by having the mouths of all the cross sewers, communicating with this main duct, fitted with flaps, the head of water derived from the Thames, which would be 15 feet at springs, and 10 feet 8 inches at neap tides, would give a velocity, through the main sewer, of about 2 feet 6 inches and 2 feet per second respectively, which would be sufficient to clear away any deposit. This canal might also be used for loading barges to carry away the sewage, either for agricultural purposes, or for discharging lower down the river, or out at sea.

It was further proposed to form cross drains, at convenient distances apart, from the Thames to the main sewer, which should be flushed by a head of water from the river at high water,—all the collateral drains into these being fitted with flaps. These, it was contended, might be kept nearly level,—the head of water being abundant for thoroughly flushing them.

The collateral drains being constructed with a good fall, and communicating at each end with the cross drains, could be thoroughly flushed at stated periods.

The question of the applicability of the existing sewers was then examined, and from data afforded by Captain Vetch's sections, it was considered that they might be made available. The large proportion of 41 miles of open ditches (in 1848) to 30 miles of closed sewers, was urged as a strong argument for the introduction of an entirely new system.

It was urged, that the chief point to aim at, was the adoption, if possible, of a system that would work well without any mechanical pumping,—as steam-power could be added, if found necessary, for discharging the sewage matter into the Thames at high water.

December 13th, 1853.

The discussion was resumed on Mr. Harrison's paper, "*On the drainage of the district south of the Thames,*" and was continued throughout the evening.

The complete system of sewerage introduced at Hamburgh, since the great fire, by Mr. Lindley, M. Inst. C. E., was alluded

to as a good instance of the efficiency of the plan of flushing sewers, even in very flat districts, and with syphon dips, when there existed a head of water like that from the Alster lake, which was 13 feet above the high-water mark of the Elbe.

The culvert through which the river Froome passes beneath the float, and flows into the Bristol river, was also described; and from these and other examples of the advantages of flushing sewers, that system was urged to be preferable to the labour and expense of pumping up from depths below low-water mark, the ordinary sewage contents, without dealing with the rain-water falling during thunder-storms, which, it was contended, could not be raised by any amount of steam-power which could be practically adopted. In fact the employment of steam-power, for pumping out the sewage, was opposed on the grounds of the constant expense, and the liability to stoppage from accidental causes. It was also argued, that the drainage of fen lands by steam-power was not analogous, as the fen water-courses were so large as to form reservoirs, whence the pumps lifted the water, in a given, but lengthened, period of time; and even then, not so as to avoid such back-flooding as could not be admitted for town drainge.

The best systems proposed were stated to be, the interception of the highland waters, the carrying away by gravitation all the contents of the sewers which could be discharged into a low point of the Thames by natural means, and resorting to pumping only for such portions of the metropolis as were too low for any other system. Such, it was contended, was the plan which had been proposed by Mr. J. R. M'Clean, to the Commissioners of Sewers, in 1849; and in a review of the systems proposed by Captain Vetch, the late Mr. Foster, and Mr. Bazalgette, the accordance with and deviations from the original plan were pointed out and commented on.

The necessity for providing against any chance of flooding the basements of the houses, by allowing the main sewers to become filled and be under pressure, was insisted on. Doubts were expressed as to the possibility of obtaining sufficient velocity to scour out such main sewers as those proposed to be flushed from the Thames, and having their outlet at Greenwich.

The question of pipe-drains and brick sewers was again entered upon, and it appeared, that experience confirmed the previous impressions, of the applicability of the pipes to house drainage only, when they had rapid fall and were of sufficient area; but that nothing could be relied upon for street sewers, except brick constructions sufficiently large to permit access within them;— they should also be permeable, so as to act as drains in conveying away the land water from the districts which they traversed.— It was stated, that in Lambeth, there were spots which, about 25 years since were full of water, but which at present, during the summer, were found to have been thoroughly dried by the action of the sewers passing through or near them.

In treating the questions of detail, it was shewn that the brick sewers never, practically, became elongated cesspools, as had been asserted; that there was really greater scouring power in an egg-shaped sewer than in a pipe drain; that the alleged smooth interior of the pipes was illusory, as their joints were more liable to occasion stoppages than the joints of the brickwork; that the interior of the latter did, practically, soon become covered with a slimy matter, which aided the flow; and that deposits rarely occurred, except where the sewers were too flat and too small.

INSTITUTION OF MECHANICAL ENGINEERS, BIRMINGHAM.

October 20th, 1853.

The following paper, by Mr. WILLIAM S. GARLAND, of Soho, Birmingham, was read:—

Description of the new pumping engines at the Birmingham water works.

The intention of the author in this paper, which describes a pair of pumping engines, manufactured by Messrs. James Watt and Co., of Soho, for the Birmingham Water Works Company, was stated to be rather to place before the Institution a record of well and successfully executed works, than to claim any particular novelty in their construction.

These water works were established in the year 1830, and the company then erected two engines, having cylinders of 61 inches diameter, and 8 feet stroke, each working two pumps of 18 inches and 20 inches diameter, and of 6 feet and 8 feet stroke respectively to the lower levels of the town, or working one pump only when raising water to the upper reservoir. These engines were found of sufficient power for the necessary supply until the year 1850; at which time the demand had so much increased that the company determined, at the recommendation of Mr. Rofe, their engineer, to augment their establishment by the addition of two new engines of greater power.

The cylinders of these engines are of 72 inches diameter and 10 feet stroke, working a pump of 23 inches diameter, also of 10 feet stroke, under a head of 252 feet, which with the bends in the main and friction is equal to a total resistance of 285 feet, and to a load upon the plunger of 124 lbs. per square inch, or, upon the steam-piston, of 13 lbs. per square inch. The weight upon the plunger required to overcome the load upon the air-pump, the friction of the engine, and to maintain a velocity of 10 strokes per minute, is nearly 26½ tons, which is equal to 142 lbs. per square inch upon the area of the 23-inch plunger, and 14½ lbs. upon the piston. The power, therefore, of each engine, when

making 10 strokes per minute, is equal to 180 horses; and the total power which the company now have for supplying the borough is equal to 530 horses.

The cylinders have steam-cases, and are enclosed in a covering of felt, having an outside casing of wood, to prevent the radiation of heat; and the top of the cylinder and upper nozzle are covered in a similar manner.

The steam-valve, equilibrium-valve, and exhaustion-valve, are 13, 15, and 18 inches in diameter respectively, and of the double-beat construction, by which the principal part of the pressure that the common conical valve is subject to, is removed. The steam governor-valve is made of the single conical form, (there being no necessity for making this valve upon the double-beat principle,) and it is regulated by a screw and wheel handle.

The load on these engines is a variable one, to the extent of the difference of the dead level of the upper reservoir and the amount of friction of the water in *transitu;* and it sometimes happens that the water is being drawn off faster than the engine supplies it; and the velocity of the water beyond where the great draught occurs is consequently decreased, and the resistance proportionably diminished.

To prevent any accident to the engine by going out too suddenly, in consequence of this diminished resistance, a throttle-valve is placed between the upper and lower nozzle, and in the pipe communicating with the top and bottom of the cylinder, which is regulated in its opening by a screw and wheel handle; and by contracting the passage, or in other words, wire-drawing the equilibrium, the equalization of pressure between the top and bottom of the cylinder is more slowly formed, during the time the plunger is descending, to the extent the weight is in excess of the diminished resistance. In these engines this valve has been found of invaluable service, and it will even hold the plunger at the top of the stroke. It acts exactly like putting on a break to a crane when lowering a weight, without absorbing any power or causing any disturbance to the working of the engines.

The opening of the steam, injection, and exhaustion-valve, is regulated by a cataract, and the speed of the engine is thus under the control of the engine-man. The equilibrium-valve is opened by quadrant catches, and is dependent upon the closing of the exhaustion-valve; the former being opened upon the closing of the latter, and shut in the usual manner by a tappet upon the plug-rod.

The injection-valve is also made upon the double-beat principle, to render the strain upon the exhaustion-valve spindle as little as possible, by relieving it of all unnecessary pressure—the underside of it being open to the condenser.

In the event of the bursting of any pipe in the main, and the resistance to the plunger being suddenly removed, a detent is fixed upon the plug-rod, to prevent the repetition of a blow upon

the spring beams by the catch-pins. This detent comes into action upon the engine making more than its usual length of working stroke, by holding the steam-handle down, and thus preventing the opening of the steam-valve. This adjunct to the hand-gear, though it may never be brought into operation from such an occurrence, would evidently be of great value in such a case.

The air-pump is of 34 inches diameter and 5 feet stroke, and the condenser of similar capacity. The air-pump bucket is fitted with a brass annular or ring-valve, and the delivery and foot-valves are of the usual construction, or what are termed flap-valves. A vacuum is obtained, varying from 27 to 29 inches, according to the state of the atmosphere. Each engine has its separate condenser cistern, formed of cast-iron, which is supplied by a cold-water pump of 13½ inches diameter, and making 5 feet stroke. The feed-pump is of 6½ inches diameter, and 2 feet 6 inches stroke, fitted with an air-vessel. The plunger of the main pump is as before stated, 23 inches diameter, and of the same length of stroke as the steam-piston, viz., 10 feet. The suction-valves and delivery-valves of the pump are of the double-beat kind, and fitted in pairs, for the purpose of giving additional security to the action of the pump, in the event of one of them sticking or becoming otherwise deranged. They are of cast-iron, and their beating faces are composed of a mixture of tin and lead, which is run into a dovetail recess turned in the cast-iron seat, and thereby becomes perfectly fixed. The water-way through these valves is of the same area as the plunger, and the lift of them is about 2 inches; the blow, when shutting, being scarcely perceptible. These valves were taken out after 6 months' work, and the beating faces of them were as perfect as when they were first put in.

The air-vessel is 7 feet internal diameter and 18 feet high, or 15 feet high above the delivery branch into the main; and it is replenished with air by a separate pump, of 6 inches diameter and 3 feet 6 inches stroke. An air-cock is fixed upon the suction-pipe of this pump, by which the necessary quantity of air to be supplied is regulated. This cock only requires to be partially open, and, when closed entirely, the pump lifts water only. The air-vessel is of great importance, as by its equalizing action the motion of water in the mains is rendered continuous, and a less weight, in consequence, is required to give the necessary velocity to the descent of the plunger in the out-door stroke. At the top of the pump-plunger is fixed the pole case, containing the necessary weights to overcome the load or resistance, and, as before stated, is equal, with the plunger and rod, to about 26½ tons.

Upon the first delivery-pipe joining the air-vessel is fixed a safety discharge-valve 6 inches diameter, loaded by a lever and weight, a little above the pressure upon the main, to prevent any undue force being thrown upon the pump, from the accidental shutting of the sluice cocks between the engines and the town.

The main lever or working-beam is 30 feet long, cast in two plates, each of 3 inches in thickness, and the depth of it in the middle is 6 feet, and, at the ends, 2¼ feet. Each of the plummer blocks has saddles of cast-iron between them, and wooden spring beams 30 inches deep and 20 inches wide.

It may be interesting to state, that the quantity of water lifted by every stroke of each engine is equal to 180 gallons, or 1800 gallons per minute, and 108,000 gallons per hour; weighing upwards of 483 tons lifted in each hour.

Mr. Garland explained the drawings of the engine and pump, and stated that the first engine was started in July, 1852, and the second in April, 1853.

In answer to an enquiry, whether it had been found requisite to have double valves to the pumps, from any accidents having happened, as there would be the disadvantage of an additional load on the piston to lift the extra valves, which would probably amount to 1 lb. per square inch,—Mr. Garland said no difficulty had been experienced with the valves: the double valves were only adopted as a measure of precaution, for obtaining additional security to the action of the pump working under such a heavy pressure. And in reply to other questions put to him, he remarked that the pressure of steam was 12 lbs. per square inch, and it was cut off at one-third of the stroke—expanding through two-thirds. The load on the engine was constant, except the variation in friction of the water in the mains, according to the level at which the greatest discharge of water happened to be taking place; the water being always forced against the head of the upper reservoir at the highest part of the town, which was 252 feet above the engine. The only difference made would be in the speed of the engine: the usual speed was 10 strokes per minute, equal to 200 feet per minute average speed of the steam-piston and the pump-plunger. The actual pressure of water on the pump—124 lbs. per square inch, as named in the paper—was measured by a Bourdon's gauge, fixed in the engine-house; and there was found to be very little fluctuation in the pressure,—the variation rarely amounting to 5 lbs. per inch. The actual duty obtained by the engines, from the coal consumed, had not been ascertained, because the only fuel used was Staffordshire coal-slack; and as its evaporative value, compared with the best Welsh coal (which was invariably used in testing the duty of a pumping engine) was not known, there had been no opportunity of obtaining a definite result as to duty.

Mr. Cowper remarked, that the steam-pressure was small as compared with the Cornish pumping-engines, and he considered that a higher pressure would be more economical. He thought the pump appeared large for keeping the air-vessel supplied with air, and inquired whether it had been found necessary?

Mr. Garland said the pipes from this pump were found to get

hot if sufficient water was not pumped with the air, from the quantity of heat liberated from the air under so great a compression, which was otherwise carried off by the water mixed with the air; and there was no objection in having the pump large, as the extra power for working it was spent usefully in pumping water. In answer to an enquiry of the Chairman, about the construction and working of the pump-valves and valve-seats, Mr. Garland said the valves were cast-iron, with faces and seats of a composition of tin and lead run into a dove-tailed groove, which was found to be just the right degree of softness, and appeared to stand better than any other material.

Mr. Cowper thought that composition was certainly the best for the purpose. Wood faces had been originally used by Harvey and West in their double-beat valves, but the valves were much improved by using the tin and lead faces, which adjusted themselves accurately in work, and were very durable. He thought the form of valve shewn in the drawings was originally due to Mr. Slade. It was, in his opinion, preferable to make a pumping-engine double-acting, on the bucket and plunger plan, with the plunger half the area of the bucket, so as to pump half the water in the up-stroke, and half in the down-stroke; thus enabling an engine and pump of half the size to do the same work; also to add a crank and fly-wheel, and work at a higher speed, which further reduced the size and cost of engine and pump. In one instance that he knew, there were four 150 horse-power engines on this plan working, very satisfactorily, from 12½ to 21 strokes per minute, with 7 feet length of stroke. But he considered the horizontal engine, with direct-acting pump and crank, was the most advantageous and economical, when the water to be pumped was near the engine-house floor.

The Chairman observed that it was an important subject, and the paper read was of much interest, from its practical nature.

LIST OF GRANTS OF PROVISIONAL PROTECTION.

[*Cases in which a full Specification has been deposited.*]

2777. Louis Alexandre Michel, of Paris, for a system of apparatus for sawing and breaking sugar.—[*Dated November 29th.*]

2819. Charles William Hockaday, of Port Hall, Brighton, for a certain chemical compound or compounds, applicable as a remedy or remedies for scorbutic and other affections of the human body.—[*Dated December 5th.*]

2830. John Mold, of Portland-terrace, Westmoreland-road, Walworth, for improvement or addition to augment convenience, by transformation and facility, the different lines required in the erection or manufacturing edifices or structures by appara-

tus, tools, or instruments, suitable for the different capacities of operatives and general surveying.—[*Dated December* 6*th.*]

[*Cases in which a Provisional Specification has been deposited.*]

1853. Henry des Moutis, of Paris, for an improved system of publicity.—[*Dated August* 9*th.*]

2272. Alexander Turiff, of Paisley, for improvements in retarding apparatus for the prevention of accidents on railways.

2276. William Crofts, of Derby-terrace, Nottingham Park, for improvements in the production of figuring in weaving.

2278. Henry Stevens, of Trafalgar-square, for improvements in the preparation of vegetable substances for the purpose of preserving the same,—being a communication.

The above bear date October 5*th.*

2290. Charles Augustus Holm, of Cecil-street, for improvements in machinery for raising or propelling elastic and non-elastic fluids.—[*Dated October* 6*th.*]

2328. John Colin Sharp, of Paisley, for improvements in retarding apparatus for the prevention of accidents on railways.—[*Dated October* 11*th.*]

2344. Robert William Waithman, of Bentham House, Yorkshire, for improvements in apparatus for applying paint, varnish, and other liquid substances; and also for cleaning carriages, ships, roadways, houses, and other buildings.—[*Dated October* 12*th.*]

2364. William Jones, of Porchester-street, Hyde Park-square, for a certain chemical compound or compounds applicable as a remedy for cuts, scalds, burns, wounds, and accidents of a similar nature to which the same can or may be applied.—[*Dated October* 14*th.*]

2406. Gustavus Gidley, of Robert-street, Hoxton, and John Bell Muschamp, of Claremont House, Kensington, for an improvement in making India-rubber solution for waterproofing cloths or other articles, without the offensive smell produced by the use of naphtha, turpentine, oils, &c.

2407. Peter Armand Le Comte de Fontainemoreau, of South-street, for an improved composition to be applied in substitution of bone and horn,—being a communication.

The above bear date October 19*th.*

2428. Jonathan Woofenden, of Belfast, for improvements in power looms for weaving.—[*Dated October* 20*th.*]

2432. James Garth Marshall and Peter Fairbairn, both of Leeds, for improvements in machinery for combing flax, tow, wool, and other fibrous substances.—[*Dated October* 21*st.*]

2452. Edward John Montagu Archdeacon, of Gravel-lane, for an improved method of indicating places, divisions, or contents in Directories.

2454. Charles Fly Blunt, of Montague-place, Russell-square, for an improved artificial fossil coal fuel, which he desires to denominate "Blunt's diamond coal fuel."

The above bear date October 24th.

2486. George Edward Dering, of Lockleys, for improvements in galvanic batteries.

2490. William Mc Naughton, of Manchester, for improvements in printing yarns or worsteds for weaving carpets; also in printing carpets, woollen, silk, cotton, and other textile and felted fabrics or fibrous substances.

The above bear date October 27th.

2499. William Thompson, of Clayton-street, Lambeth, for instantaneously extinguishing conflagrations in ships' holds, warehouses, and other buildings.—[*Dated October 28th.*]

2520. John Bottomley, of Bradford, Yorkshire, for improvements in ornamenting textile fabrics.

2532. Thomas Sanders Bale, of Cauldon-place, Staffordshire, and Daniel Lucas, of Stoke-upon-Trent, for improvements in ornamenting the materials of, and articles manufactured in pottery, as bricks, tiles, slabs, &c., and also in glass, slate, stone, and other plastic substances.

The above bear date November 1st.

2542. Benjamin Butterworth, of Caldershaw, near Rochdale, for improvements in combining oil with other liquids for the obtainment of a new lubricating compound,—being partly a communication.—[*Dated November 2nd.*]

2554. Peter Hindle, of Ramsbottom, for improvements in power looms for weaving.—[*Dated November 3rd.*]

2558. James Scott, residing in Shrewsbury, for an improved apparatus for shifting carriages, waggons, engines, and other vehicles on railways and tramways.—[*Dated November 4th.*]

2570. John Banks Nicklin, of Bartholomew-lane, for improved gelatinous or glutinous compounds for lubricating railway and other machinery.—[*Dated November 5th.*]

2601. James Atkins, of Birmingham, for an improvement or improvements in ash-pits for grates.

2602. William Pidding, of Tachbrook-street, Pimlico, for improvements in the manufacture of fabrics made of silk, cotton, wool, flax, hemp, straw, grasses, fibres, mohair, and other hair, spun glass, and enamelled, glazed, or plain wire, and in the application of some of those materials, and also in the machinery or apparatus connected with such manufacture.

2603. William Rodger, of Shawfield-street, King's-road, Chelsea, for improvements in anchors.

2604. James Stevens, of Darlington Works, Southwark Bridge-road, for improvements in the steps or bearings of the axles or shafts of gas-meters.

2605. Samuel Mead Folsom, of Massachusetts, U. S., for a new or improved instrument for ironing clothes or various other articles,—being a communication.

2606. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in preventing accidents on railways, also in shifting and lifting railway carriages,—being a communication.

The above bear date November 10*th.*

2607. William Parker, of Birmingham, for an improvement or improvements in bearings for machinery.

2608. Salomon Sturm, of Carpenter's-buildings, for machinery for the manufacture of optical lenses.

2609. Alexandre André Victor Sarrazin de Montferrier, of Paris, for a new rotatory steam-engine.

2610. Edward Gregson Banner, of Cranham Hall, Essex, for improvements in saddlery and harness.

2611. Henry Walker, of Gresham-street West, for improvements in means of communication from one part of a railway train to another.

2612. James Willis, of Wallingford, for improvements in buckles.

2613. Richard Dryburgh, of Leith, for improvements in the means of holding staves while being cut.

2614. William Steel, of Glasgow, for improvements in machinery or apparatus for mashing malt.

2615. John Platt, of Oldham, for certain improvements in apparatus or machines for forging, drawing, moulding or forming spindles, rollers, bolts, and various other articles in metal.

2616. Henry Kilshaw, of Birch, near Middleton, Lancashire, and Richard Hacking, of Bury, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.

2617. Abel Easton, of Barnard's-inn, for an improved lamp.

2618. Abel Easton, of Barnard's Inn, for a liquid chemical compound for the production of artificial light.

2619. James Hill Dickson, of Evelyn-street, Lower-road, Deptford, for improvements in the process of preparing flax or similar fibrous material, and rendering it fit for spinning and weaving.

2621. Johan Martin Levien, of Davies-street, Grosvenor-square, for an improved construction of expanding table,—being a communication.

The above bear date November 11*th.*

2622. Stephen Barker, of Birmingham, for an improvement or improvements in shaping metals.

2623. François Amand Delande, of Paris, for a new metallic composition.

2624. Henry Kilshaw, of Birch, near Middleton, Lancashire, and Richard Hacking, of Bury, for improvements in machinery or apparatus to be employed in the preparation of cotton and other fibrous substances for spinning.

2625. John Gedge, of Wellington-street, Strand, for improvements in the means of consuming or otherwise preventing the escape of smoke from flues or other smoke vents,—being a communication.

2626. John Gedge, of Wellington-street, Strand, for improvements in the manufacture of metallic compounds,—being a communication.

2627. William Austin, of Holywell-street, for improvements in the manufacture of casks.

2628. Thomas De la Rue, of Bunhill-row, for an improvement in the manufacture of paper.

2629. William Austin, of Holywell-street, for improvements in apparatus for trapping passages into sewers or drains.

2630. Constant Busson, of Paris, for certain improvements in finger-keyed musical instruments,—being a communication.

The above bear date November 12th.

2631. John Singleton Copley Hill and Edwin Cottrill, both of Birmingham, for an improvement or improvements in stamps and presses; a part or parts of which improvements may be applied to other purposes.

2632. William Hadfield, of Manchester, for certain improvements in looms for weaving.

2633. Samuel Fletcher Cottam, of Manchester, for improvements in machinery for spinning, doubling, and reeling cotton and other fibrous substances.

2634. Henry Willis, of Manchester-street, for improvements in the construction of organs and free-reed instruments.

2635. Alexander Cunninghame, of Glasgow, for improvements in the manufacture or production of sulphuric acid.

2636. Matthew Gray, of Glasgow, for improvements in weft forks for power-looms.

2637. Anthony Park Coubrough, of Blanefield, Stirling, for improvements in bleaching apparatus.

2639. William Smith, of Mauchline, Ayr, for improvements in ruling ornamental figures.

2640. Michael Fitzgerald, of Sorrel Island, Clare, for an improved means or method of communicating between different parts of a railway train.

2641. Charles De Bergue, of Dowgate-hill, for an improvement or improvements in machinery or apparatus for removing patterns from moulds for castings.

The above bear date November 14th.

2642. John Josias Catterson, of Islington, for improvements in carriage springs.

2643. Charles Emilius Blank, of Trump-street, for improvements in winding yarn into hanks,—being a communication.

2644. John Liddell, of Glasgow, for an improvement or improvements in power loom weaving.

2645. John Cameron and James Napier, both of Loughor, Gla-

morganshire, for improvements in obtaining gold and silver from ores, alloys, or compounds, containing such metals.

2646. John Hall Brock Thwaites, and William Bird Herapath, both of Bristol, for improvements in the manufacture of quinine and other alkaloids.

2647. Adrien Delcambre, of Paris, for improvements in machinery for distributing type.

2648. Joseph Fry, of Cannon-street, West, for improvements in preparing solvents for India-rubber and gutta-percha, and in rendering waterproof fabrics free from odour.

The above bear date November 15th.

2649. Peter Alexander Halkett, of the Albany, for improvements in apparatus for lifting and lowering ships and other heavy bodies, either submerged or otherwise.

2650. John Ellerthorpe, of Kingston-on-Hull, for retarding and stopping railway trains and railway carriages.

2651. James Wills Wayte, of Gate-street, Lincoln's-inn-fields, for certain improvements in self-feeding furnaces.

2652. John Riddel Musgrave, Robert Musgrave, and James Musgrave, of Belfast, for improvements in hot-air stoves.

2653. Philip Hill, of Gravel House, Coggeshall, for improvements in weaving plush and other piled fabrics,—being partly a communication.

2654. John Ronald, of Paisley, for improvements in fixing colors on yarns and cloths.

2655. John Henry Johnson, of Lincoln's-inn-fields, for improvements in thrashing machines, and in apparatus connected therewith,—being a communication.

2656. David Pratt, of Birmingham, for certain mechanical arrangements for raising thimbles; the same to be worked by steam, water, or other power,—thereby superseding hand-labour.

2657. John Ferguson, of Heathfield, Lanark, for improvements in furnaces and fire-places, and in the prevention of smoke.

2658. William Frederick Greenfield, of Ipswich, for improvements in communicating from one part of a railway train to another.

2659. Thomas Jackson, of Commercial-road, Pimlico, for improvements in the manufacture of hats.

2660. James Bristow, of Bouverie-street, and Henry Attwood, of Holland-street, Blackfriars-road, for an improved mode of constructing marine boilers.

The above bear date November 16th.

2661. George Carter, of Mottingham, for improvements in the construction of steam-engine boiler and other furnaces.

2662. John Clare, jun., of Exchange-buildings, Liverpool, for improvements in the manufacture of bar and sheet metals; in machinery connected therewith, and in the application of such metals to various useful purposes.

2663. George Dugmore and George Haywood Millward, both of Birmingham, for a new or improved method of signalling or communicating between trains on railways.

2664. Solomon Abraham and Samuel Victor Abraham, of Lisle-street, for communicating information or directions to persons in charge of railway trains.

2665. William Ashton, of Manchester, for certain improvements in machinery or apparatus for manufacturing braid.

2666. John Banfield, of Birmingham, for a double-acting railway signal for preventing collisions or accidents on railways.

2668. Charles Burton, of New Oxford-street, for certain improvements in hand and draught carriages for common roads.

2669. Thomas Bourne, of West Smithfield, for improvements in the construction of buckles.

2670. Augustus Johann Hoffstaedt, of Albion-place, Surrey, for an improved mode of preparing the colour known as artificial ultramarine.

2671. Robert Griffiths, of the Strand, for improvements in propelling vessels.

The above bear date November 17th.

2672. Patrick Francis Keogh and William Ashley Wilson, both of Liverpool, for an improvement in steam-engines.

2673. Percival Moses Parsons, of Duke-street, Adelphi, for improvements in railway and other carriages and vehicles.

2674. Alfred Guy, of Upper Rosoman-street, Clerkenwell, for a portable water closet, with water supply without the action of pump.

2675. Charles Fernihough and James Fernihough, both of Victoria Iron Works, Dukinfield, for improvements in machinery or apparatus for wringing or twisting, glossing, stretching, and drying silk, cotton, wool, flax, and other fibrous materials.

2676. Thomas Holmes, of Pendleton, for improvements in ventilating drying stoves.

2677. James Gall, jun., of Edinburgh, for improvements in electro-magnetic engines.

2678. Amédée François Rémond, of Birmingham, for an improvement or improvements in the construction of steam-boilers or generators.

2679. William Taylor, of Park-street, Regent's-park, for improvements in anchors.

2680. James Melville, of Roebank Works, Lochwinnoch, for improvements in printing textile fabrics and other surfaces.

2681. Jean Baptiste Clavières, of Paris, for an improved mode of giving publicity.

2682. Moses Poole, of the Avenue-road, for improvements in surface condensors and in evaporators and heaters for steam-engines,—being a communication.

2683. Patrick Benignus O'Neill, of Paris, for an improvement in the manufacture of perforated buttons,—a communication.

2684. John Harcourt Brown, of Arthur's Seat, for improvements in the manufacture of artificial skins.
2685. Henry Richard Cottam, of Sussex-terrace, Hyde-park-gardens, for improvements in the construction of portable houses.
2686. James Rice, of Foley-place, and William Matthews, of Portugal-street, for improvements in instruments for taking and applying vaccine matter.
2687. Richard Stuart Norris, of Warrington, and Ebenezer Talbott, of Crewe, for an improvement or improvements in the manufacture of iron.

The above bear date November 18th.

2688. James Harris, of Hanwell, for improvements in apparatus for heating water and other fluids.
2690. Moses Poole, of Avenue-road, for improvements in breech loading fire-arms, and in cartridges for use with such fire-arms, —being a communication.
2691. William Austin, of Holywell-street, for improvements in the manufacture of tiles and tubes.
2692. Ellis Rowland, of Mossley, near Belfast, for improvements in apparatus to be applied to a railway truck or carriage, to enable a guard or person to sound a whistle, and, when necessary, to put such truck or carriage in motion independent of the locomotive engine.
2693. Thomas Isaac Dimsdale, of Dublin, for the use and preparation of certain solid and liquid substances for the defecation, purification, and decolorization of saccharine juices and syrups or solutions, and for neutralizing, decomposing, and absorbing noxious and fetid gases.
2694. John Gerald Potter and Robert Mills, both of Darwen, for certain improvements in the manufacture of carpets.
2695. Emanuel Wharton, of Birmingham, for improvements in the manufacture of railway wheels.
2696. Henry Daniell, of Saint Austell, for certain improvements in apparatus for drying clay.
2697. Richard Farmer Brand, of South-terrace, Bermondsey, for improvements in fire-arms and ordnance.

The above bear date November 19th.

2698. Walter Henry Tucker and William Rashleigh Reeves, both of Tiverton, for improvements in locks.
2699. John Scott, jun., of Greenock, N. B., for improvements in steering vessels.
2700. Henry Wiglesworth, of Newbury, for improvements in pistons.
2702. Sir John Scott Lillie, of South-street, for improvements in apparatus for the production of carburretted hydrogen gas,—being a communication.

2703. Robert Jamieson Sibbald, of Paddington, Edge Hill, for an improved mode of communicating from vessels to the shore, or from one vessel to another.

2704. Augustus Radcliffe, of Chichester-place, King's Cross, for an improved construction of glazier's diamond.

2705. John Cashmore, of Bevis-marks, for an improved mode of communicating signals on railways.

2706. William Joyce, of Greenwich, and Thomas Meacham, of the same place, for certain improvements in marine steam-engines.

The above bear date November 21st.

2708. William Greaves, of Leeds, for an indicator alarum applicable to railways and railway trains.

2709. Alexander Bain, of Paddington, for an improvement in cases for holding cards.

2710. William Mee, of Leicester, for improvements in the manufacture of braces.

2711. Alfred Bird, of Birmingham, for certain improvements in apparatus to be employed for the purpose of communicating signals on railway trains and railways; which improvements are also applicable to other similar purposes.

2713. Frederick Meyer, of Paradise-street, Lambeth, for improvements in treating fatty and oily matters to render them applicable for the manufacture of candles and night lights.

2714. Frederick Levick, of Cwm Celyn and Blaina Iron Works, Monmouthshire, and Joseph Fieldhouse, of the same place, for improvements in machinery for raising coal and minerals from collieries and mines.

2715. Frederick Meyer, of Paradise-street, Lambeth, for improvements in bleaching oils and fats.

2716. Charles Ramsay, of North Shields, for improvements in ships' and other pumps.

2717. William Pegg, of Leicester, for improvements in instruments for cutting out parts of garments and other articles, and in grinding and sharpening cutters for the same.

2718. Francis Arding, of the Albert Iron Works, Uxbridge, for improvements in machinery for cutting, splitting, and bruising vegetable substances.

2719. Benjamin Burleigh, of the Great Northern Railway, King's Cross, for improved railway crossings, as adapted to the double-headed rail, and the ordinary rail and chair.

The above bear date November 22nd.

2720. Henry Robert Abraham, of Howard-street, Strand, for improvements in coffins and in hearses, and improvements in receptacles for coffins for their transmission.

2721. Charles Frederick Stansbury, of Cornhill, for an apparatus to be attached to a drill for sowing grain or other seeds, for the

purpose of mingling guano or other pulverized manure with the grain or seed to be sown, and depositing it in the ground at the same time with the seed,—thereby greatly diminishing the quantity of guano or other manure required to produce the best fertilizing effects,—being a communication.

2722. John Fielding Empson, of Birmingham, for improvements in the manufacture of wire.

2723. John Hill, sen., and John Hill, jun., both of Manchester, for improvements in machinery for winding, doubling, and spinning silk.

2724. Joseph Amos, of Bristol, for improvements in preparing wood to be employed in the manufacture of casks and other vessels for containing liquids.

2725. John Timewell, of Duke-street, St. James's, for improvements in cutting or shaping materials to be employed in the manufacture of articles of dress.

2726. James Dilks, of Nottingham, for improvements in bands for binding (more effectually than heretofore) packets or parcels of lace and other articles.

2727. Edward Wilkins, of Queen's-row, Walworth, for an improvement or improvements in draining land.

2728. William Beckett Johnson, of Manchester, for improvements in steam-engines.

2729. John Drumgoole Brady, of Cambridge-terrace, for an improved mode of, or a new arrangement of straps for, slinging knapsacks.

2730. Thomas William Kinder, of Dublin, for improvements in the construction of the permanent way of railways.

The above bear date November 23rd.

2731. James Lovell, of Glasgow, for improvements in the application of heat to various useful purposes.

2732. David Chalmers, of Manchester, for improvements in railway breaks and signals.

2733. Hugh Mason, of Ashton-under-Lyne, and John Jones, of Manchester, for improvements in machinery or apparatus for doubling, twisting, and spooling woollen, cotton and other yarns.

2734. Stephen Holman, of Colney Hatch, for an improved construction of double-action pump.

2735. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for a novel construction of apparatus to be used as a chest expander, and as a uterine or abdominal supporter,—being a communication.

2736. Evan Matthew Richards, of Swansea, for improvements in feed plates to be used for oxidizing lead and refining silver and lead.

2737. Samuel Cunliffe Lister, of Manningham, for improvements in combing wool, cotton, and other fibrous material.

2738. Elmer Townsend, of Massachusetts, U.S., for new and useful

improvements in machinery for sewing cloth or other material, —being a communication.

2739. William Jones, of Kilney Cottage, Swansea, for improvements in the manufacture of bricks.

2740. Daniel Lancaster Banks, of St. James's place, Toxteth-park, Liverpool, for improvements in rotatory engines.

The above bear date November 24th.

2742. Davidson Nichol, of Edinburgh, for improvements in the manufacture of envelopes.

2743. John Berry, of Manchester, for improvements in the machinery or apparatus for manufacturing wire fencing.

2744. William Calder, of Glasgow, for improvements in the treatment and finishing of threads or yarns.

2745. William Leigh Brook and Charles Brook, jun., both of Meltham Mills, near Huddersfield, for certain improvements in preparing, dressing, finishing, and winding cotton and linen yarns or threads, and in the machinery or apparatus connected therewith.

2746. Alexander Drew, of Glasgow, for improvements in ornamenting woven fabrics and other surfaces.

2747. John Henry Johnson, of Lincoln's-Inn-Fields, for improvements in carding engines, for carding cotton and other fibrous materials,—being a communication.

2748. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in the production of printing surfaces,—a communication.

2750. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements applicable to pens and pencils for writing or drawing,—being a communication.

2751. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in rotary engines,—being a communication.

2752. Charles Calixte André Grenier, of Paris, for improvements in the preparation of paints for buildings and other uses.

2753. Enoch Wilkinson and William Rye, both of Oldham, for improvements in power looms.

2754. Emmanuel Barthélemy and Tony Petitjean, of Upper John-street, Fitzroy-square, and Jean Pierre Bourquin, of Newman-street, Oxford-street, for improved means of ornamenting glass.

The above bear date November 25th.

2755. Joseph Wormald, of Vauxhall, and George Pollard, of York-road, Lambeth, for an improved pipe wrench.

2756. William Crofton Moat, of the Strand, for an improved truss.

2757. Joseph Stenson, of Northampton, for improvements in the manufacture of iron.

2758. Georges Edouard Gazagnaire, of Marseilles for improvements in the manufacture of nets for fishing and other purposes.

2759. Hippolyte Coutte, and Jean Michel Hammerbacher, both of Paris, for an improved machine for washing linen and other textile articles.

2760. Jules Roth and Henri Danner, of Mulhouse, for an improvement in cards for carding.
2761. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in straining mill saws,—being a communication.
2762. Louis Cornides, of Trafalgar-square, for combining gelatine with certain other substances, and coloring the same, so as to produce various objects capable of resisting atmospheric influences.
2763. Thomas Chambers and John Chambers, both of the Thorncliffe Iron Works, near Sheffield, for certain improvements in kitchen sinks.
2764. Joseph Scipion Rousselot, of Nîmes, France, for an improved application of magneto-electricity for driving machinery and for neutralizing the impulsive force of machinery in motion.
2765. Joseph Michel Henri Perodeaud, of Paris, for an improved mode of treating peat for the conversion of the same into an artificial coal, which may be used in that state or afterwards reduced to coke.

The above bear date November 26th.

2766. William Pritchard, of Clerkenwell, for improvements in buffers for diminishing the shock in the collision of railway trains.
2767. John Walmsley, of Accrington, and John Ingham, of Blackburn, for improvements in looms.
2768. Prix Charles Jean Baptiste Sochet, of Paris, for improvements in obtaining motive power by means of heated gases.
2769. Robert Hawkins Nicholls, of Bedford, for improvements in hoeing and otherwise cultivating land.
2772. Alexander Macomie, of Percy-street, Rathbone-place, for an ornamental piece of furniture, shaped like a vase, constructed to contain or form a writing and drawing-desk.
2774. Samuel Hurrell, of New North-street, for improved machinery for measuring and winding or rolling fabrics.

The above bear date November 28th.

2775. Patrick Kelly, of Drogheda, for an improved apparatus for cultivating, preparing, and treating land, and for sowing seeds.
2778. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in fire-arms,—being a communication.
2779. Joseph Moore, of Lincoln, for an improvement in or addition to ploughs.
2780. James Alexander Manning, of the Inner Temple, for improvements in the treatment of sewerage and other polluted liquids and the products thereof.

The above bear date November 29th.

2781. Joshua Jackson, of Wolverhampton, for a new or improved signalling apparatus.

2782. John Elce, of Manchester, for certain improvements in machinery for spinning.
2783. Peter Armand Le Comte de Fontainemoreau, of South-street, for certain improvements in the construction of the Jacquard machine,—being a communication.
2784. Edward Keating Davis, of Howley-street, Lambeth, for improvements in machinery for making pipes, sheets, still-worms, and other articles, from that class of metals called soft metals, as lead, tin, zinc, bismuth, or alloys of soft metals, that are capable of being forced out of metal receivers or chambers, through dies, cores, &c.
2785. John Hewitt, of Salford, for certain improvements in machinery or apparatus for spinning cotton and other fibrous substances.
2786. Joseph Redford, of Pilkington, near Manchester, for certain improvements in power looms.
2787. Richard Balderstone, of Blackburn, for improvements applicable to spinning machines, known as mules, and to machines of similar character for clearing or cleaning certain parts of such machines.
2788. John Patterson, of Beverley, for improvements in land rollers or clod crushers.
2789. Alphonse Loubat, of Paris, for improvements in the construction of tramways.
2790. Lewis Jennings, of Fludyer-street, for an improved mode of producing plain and ornamental sewing, and in machinery applicable thereto.
2791. Norbert de Landtsheer, of Ghent, for improvements in machinery for combing flax or other fibrous material.
2792. Francis Sewell Cole, of Childown, for a smoke-consuming apparatus for enabling every fire to consume its own smoke.

The above bear date November 30th.

2793. Thomas Garnett, of Low-moor, near Clitheroe, and Daniel Adamson, of Duckinfield, for improvements in generating steam and in consuming smoke.
2794. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in machinery for manufacturing horse-shoes,—being a communication.
2795. Alfred Isaac Jones, of New Oxford-street, for an improved cigar light.
2796. Joseph Dilworth, of Preston, for improvements in escape valves and safety valves.
2797. Thomas Hollinsworth and John Hollinsworth, both of Winwick, near Warrington, for certain improvements applicable to alarm-whistles, to be used upon railways, or as signals where otherwise required.
2798. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in the treatment or manufacture of caoutchouc,—being a communication.

2799. John Henry Johnson, of Lincoln's-Inn-fields, for certain applications of vulcanized India-rubber,—a communication.

The above bear date December 1st.

2800. James Reilly, of Manchester, for improvements in machinery or apparatus for tenonting, mortising, and sawing wood, metal, or other materials.

2801. Arthur Wellington Callen, of Peckham, for an improved excavating and dredging machine,—being a communication.

2802. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in blocks for ships and other uses,—being a communication.

2803. Henry Deacon, of Widnes, and Edmond Leyland, of Saint Helen's, for improvements in apparatus for the manufacture or production of sulphuric acid.

2804. Alexander Brown, of Glasgow, for improvements in metallic casks and other vessels.

2805. George Williamson, of Glasgow, for improvements in applying motive power.

2806. Alexander Bain, of Paddington, for an apparatus for damping paper and other substances in order to prepare the same for the reception of labels, stamps, and other like articles coated with a gummy or adhesive matter.

2807. John Charles Wilson, of Redford Flax Factory, Thornton, Kirkcaldy, N.B., for improvements in machinery for scutching flax, hemp, and other fibrous materials.

2808. George Collier, of Halifax, for certain improvements in looms for weaving.

2809. Robert Reyburn, of Greenock, for improvements in sugar refining.

2810. Samuel C. Lister, of Bradford, Yorkshire, for improvements in combing wool, hair, cotton, and other fibrous materials.

2811. Henry Bessemer, of Baxter House, Old St. Pancras-road, for improvements in the manufacture and refining of sugar.

2812. Jonathan Saunders, of St. John's Wood, for improvements in the manufacture of rails for railways.

The above bear date December 2nd.

2813. Charles Edmund Green, of Blandford-street, Portman-square, and John Bayliss, of Parliament-street, for improvements in machinery to save persons and property in case of fire; which machinery may also be applied for the purpose of raising and lowering weights of any kind; also for the purpose of compression, and for other useful purposes.

2814. Abraham Rogers, of Bradford, Yorkshire, for improvements in ventilating sewers, mines, or other subterranean works.

2815. Charles Buck, of Wellington, for an improved apparatus for retarding or stopping the progress of wheel carriages.

2816. William Dray, of Swan-lane, for improvements in the construction of portable houses and buildings.
2817. John Gwynne and James Egleson Anderson Gwynne, of Essex Wharf, Strand, for improvements in the manufacture of fuel; its preparation and applications for the reduction of ores, fusing and refining metals, cementation or making steel, and treating salts,—being partly a communication.
2818. Henry Jeremiah Iliffe, and James Newman, of Birmingham, for certain improvements in the construction of metallic bridges and other similar structures.

The above bear date December 3rd.

2820. Squier Cheavin, of Spalding, for a double action or belt-filterer.
2821. Benjamin Skillman, of Crosby-hall-chambers, for an improved mode of preparing sheets of paper suitable for postal communication.
2822. William Simons, of Glasgow, for improvements in propelling and steering vessels.
2823. Matthew Andrew Muir, of Glasgow, for improvements in check and fancy weaving.
2824. John Patterson, of Beverley, for improvements in reaping machines.
2825. Thomas Storey, of the Phœnix Foundry, Lancaster, for improvements in the construction and arrangement of apparatus employed in connection with sewers.
2826. James Robertson, of Kentish Town, for improvements in the consumption or prevention of smoke.

The above bear date December 5th.

2828. Edward Oldfield, of Salford, for improvements in machinery for spinning and doubling.
2829. John Coope Haddan, of Chelsea, for improvements in the manufacture of cartridges and of wads or wadding for fire-arms.
2831. Auguste Edouard Loradoux Bellford, of Castle-street, for the manufacture of an artificial tartaric acid, and the application of the same to useful purposes,—being a communication.
2833. Thomas Mills, of Leicester, for an improvement in the manufacture of lined gloves.
2834. William Edward Gaine, of Harewood-street, for an improvement in treating or preparing paper.
2835. Robert Christopher Witty, of Portland-place, Wandsworth-road, for improvements in the construction of boiler and other furnaces.
2836. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in printing oil-cloths and other fabrics,—being a communication.
2837. Julian Bernard, of Regent-street, for improvements in machinery or apparatus for stitching or uniting and ornamenting various materials.

2838. John Hargrave, of Kirkstall, Yorkshire, for certain improved apparatus for washing and scouring wool.
2839. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in fire-arms and ordnance,—being a communication.

The above bear date December 6th.

2840. William Slater and Robert Halliwell, both of Bolton-le-Moors, for improvements in machinery for spinning.
2841. Lewis Harvey Bates, of Bradford, Yorkshire, for improvements in machinery for stamping and cutting metal nuts and other similar metal articles.
2843. John Getty, of Liverpool, for improvements applicable to the plating of iron ships; part of which improvements is also applicable to the construction of boilers.

The above bear date December 7th.

2844. William George Reeve, of Elizabeth-street, Eaton-square, for an appendage to horse-shoes, to supersede the necessity of roughing them as hitherto practised.
2845. William Bridges Adams, of Adam-street, Adelphi, for improvements in railway wheels, their axles and boxes.
2846. William Thomas Henley, of St. John-street-road, for improvements in electric telegraphs.
2848. Benjamin Solomons, of Albemarle-street, Piccadilly, for improvements in telescopes and other glasses in their application to the measurement of distance.
2849. William Chickall Jay, of Regent-street, for an improved cloak.
2850. Joseph Goddard and Charles Yates, both of Tottenham-court-road, for certain improvements in machinery or apparatus for obtaining and applying motive power.
2851. Joseph Robinson, of Denton Mill, Carlisle, for improvements in mills for grinding corn and other substances.
2852. John Nelson, of Selby, and David Boyd, of the same place, for improvements in scutching flax and hemp.
2853. James Beall, of Cheshunt, for improvements in apparatus for applying sand to the rails of railways.
2854. William Edward Newton, of the Office for Patents, Chancery-lane, for improved machinery for drilling or boring rocks and other hard substances,—being a communication.
2855. Philippe Joseph Toussaint Bordone, of Paris, for improvements in extracting and treating the juice of beetroot and other vegetables.
2856. Marcel Gustave Laverdet, of Paris, for an improved mode of treating photographic pictures.
2857. Benjamin Murgatroyd, of Bradford, Yorkshire, for improvements in washing or scouring wool and fabrics composed entirely or partly of that material.

The above bear date December 8th.

2860. Arthur James, of Redditch, for improvements in counting, measuring, and weighing needles, and in preparing papers to receive the same.

2861. Duncan Christie and John Cullen, both of Bromley, for an atmospheric counterbalance slide valve for the steam-engine, hydraulic, and all other machines in which the slide valve is used or required.

2862. Andrew Shanks, of Robert-street, Adelphi, for improvements in instruments and apparatus for indicating or measuring weights and pressures.

2863. Charles Mackenzie, of Bayswater, and Alexander Turnbull, of Manchester-square, for machinery for paring fruit and vegetables,—being a communication.

2864. John Winspear, of Liverpool, for an improved mode of coating metals, wood, stone, and plaster, to preserve them from decay.

2865. Richard Eccles, of Wigan, John Mason, of Rochdale, and Leonard Kaberry, of Rochdale, for improvements in slubbing and roving frames for cotton and other fibrous substances.

2866. James Sutcliffe, of Manchester, for improvements in steam-engines and in apparatus connected therewith.

2867. Frederick Osbourn, of Aldersgate-street, for improvements applicable to the distribution of manure.

2869. John Henry Johnson, of Lincoln's-inn-fields, for improvements in portable cases for containing provisions,—being a communication.

2870. Gideon Morley, of Birmingham, for ornamenting or producing pictures on japanned goods, panels, canvass, or other material, whereby a vast amount of artistic skill and labour is superseded.

2871. William Schaeffer, of Stanhope-terrace, for improvements in purifying spirit.

2872. John Bourne, of Port Glasgow, for improvements in steam-engines.

2873. John Bourne, of Port Glasgow, for improvements in machinery for the production of iron ships and other similar structures.

2874. John Bourne, of Port Glasgow, for improvements in the construction of iron ships.

2875. Henry Bessemer, of Baxter House, for improvements in the construction of railway axles and breaks.

The above bear date December 9th.

2876. Allan Macpherson, of Brussels, for improvements in disinfecting sewers or other drains or depositories of fetid matters or gases, and in converting the contents thereof to useful purposes.

2877. William Muir, of the Britannia Works, Manchester, for improvements in machinery and apparatus for cutting out parts of garments.

2878. Charles Coates, of Sunnyside, for improvements in and applicable to looms for weaving.
2881. John Henry Johnson, of Lincoln's-inn-fields, for improvements in furnaces for the manufacture of steel,—being a communication.
2882. Edward Green, of Wakefield, for improvements in boilers and furnaces.
2883. Nicolas Victor Guibert, of Paris, for improvements in forge hammers.
2884. William Thornley, of Clayton West, Yorkshire, for an improved manufacture of woven fabrics.

The above bear date December 10th.

2885. Edward Orange Wildman Whitehouse, of Brighton, for improvements in effecting telegraphic communications.
2886. Thomas Holinsworth, of Winwick, near Warrington, for certain improvements in the method of applying breaks to carriages employed upon railways, and in the machinery or apparatus connected therewith.
2887. William Evans, of Myrtle-street, Hoxton, for improvements in obtaining and applying motive power.

The above bear date December 12th.

2888. William Redgrave, of Croxley-green, Rickmansworth, for the improved safety travelling cap.
2889. George Kerr Hannay, of Ulverston, for the combination and manufacture of composition grinding wheels, hones, and other grinding bodies.
2890. James Wansbrough, of the Grove, Southwark, for improvements in the manufacture of waterproof fabrics.
2891. William Frederick Plummer, of St. Mary's Overy Wharf, Southwark, for improved machinery for grinding or crushing animal, vegetable, and mineral substances.
2892. Christian Schiele, of Oldham, for improvements in preventing undue oscillation in engines, machinery, carriages, and other apparatus.
2893. André Gaspard Guesdron, of Montmartre, for an improvement in or addition to sugar basins.
2894. André Gaspard Guesdron, of Montmartre, for a method of producing plans in relievo.

The above bear date December 13th.

2896. Frederick Albert Gatty and Emile Kopp, both of Accrington, for improvements in printing and dyeing cotton, wool, silk, and other fibrous substances.
2898. Edward Beanes, of Charlotte-street, Portland-place, for improvements in the manufacture and refining of sugar.
2900. Benjamin Fullwood, of Abbey-street, Bermondsey, for certain improvements in the manufacture of cement.

2902. Richard James Norman King, of Exeter, for an improved artificial bait for fish.

2904. William Beckett Johnson, of Manchester, for improvements in machinery or apparatus for making bricks and other articles from clay and other plastic materials.

The above bear date December 14th.

List of Patents

Granted for SCOTLAND, from the 22nd November to the 22nd December, 1853.

To Ezra Jenks Coates, of Bread-street, London, merchant, for improvements in the manufacture of bolts, spikes, and nails.—Sealed 28th November.

Christopher Nickels, of the York-road, Lambeth, and Benjamin Burrows, of Leicester, for improvements in weaving.—Sealed 2nd December.

New Patents.

Sealed under Patent Law Amendment Act, 1853.

181. Andrew Edmund Brae, of Leeds, for a method of communicating signals from one part of a railway train to another,—January 24.

1275. William Babb, of Gray's-inn-road, for improvements in the manufacture of hair trimmings.—May 25.

1278. George Irlam Higginson, of Meeting-house-lane, Dublin, for improvements in machinery or apparatus for evaporating or concentrating liquids.—May 25.

1279. Frederick Russell, of Regent's-park, for improvements in raising and lowering windows, shutters, blinds, and similar appendages.—May 25.

1282. Louis Auguste Deverte, and Charles Eck, of Argenteuil, near Paris, for an improved machinery for combing wool.—May 25.

1312. William Smith, of Salisbury-street, Adelphi, for certain improvements in the machinery for, and method of, making and laying down submarine and other telegraph cables; which machinery is also applicable and is claimed for the making of ropes and cables generally.—May 28.

1323. Alfred Whaley Sanderson, of Cable-street, Lancaster, for improvements in preparing effervescing powders.—May 28.

1325. Joseph Brown, of Leadenhall-street, for the improvement of elastic spring beds, mattresses, cushions, and all kinds of spring stuffing for upholstery work generally,—making them lighter and more portable.—May 30.

1337. Hesketh Hughes, and William Thomas Denham, both of Cottage-place, City-road, for improvements in piano-fortes.—May 31.

1340. Edward Wilkins, of Queen's-road, Walworth, for improvements in pots and vessels for the growth and cultivation of plants.—June 1.

1341. Alfred Hardwick, of Liverpool, for improvements in propelling vessels.—June 1.

1350. Joseph Whitworth, of Manchester, for improvements in machinery for perforating or punching paper, card, and other materials.—June 1.

1352. William Thorold, of Norwich, for improvements in the construction of portable houses, and in machinery for raising, moving, and lowering the same,—June 2.

1354. William Hammond Smith, of Gloucester-row, Walworth, for improvements in the manufacture of parchment.—June 2.

1356. Hesketh Hughes and William Thomas Denham, both of Cottage-place, City-road, for improvements in machinery for weaving.—June 2.

1362. Jean Durandeau, jun., of Paris, for certain means of obtaining marks and designs in paper.—June 3.

1363. Ferdinand Louis Gossart, of Rue Montmartre, Paris, for a system of permanent circulation of caloric, intended to produce and overheat steam, gas, and liquid.—June 3.

1365. James Spotswood Wilson, of Tavistock-place, Russell-square, for a machine or apparatus for digging or raising earth, and applicable to agricultural or engineering purposes.—June 3.

1369. James Hayes, of Elton, Huntingdon, for improved machinery for raising and stacking straw, hay, corn, and other agricultural produce.—June 3.

1378. Edward Blackett Beaumont, of Wood-hall, Barnsley, Yorkshire, for certain improvements in bricks or tiles.—June 4.

1381. Benjamin Biram, of Wentworth, Yorkshire, for improvements in working and ventilating mines.—June 4.

1386. George Carter, of Mottingham, Kent, and George Marriott, of Hull, for improvements in the manufacture of white lead.—June 6.

1388. John Walter Friend, of Canute-road, Southampton, for an improved method of measuring and registering the distance run by ships and boats proceeding through the water; which is also applicable to measuring and registering tides and currents.—June 6.

1395. Henry George Rowe, Albert George Andrew, and William Henry Andrew, all of Sheffield, for improvements in the mode of fastening the handles of table knives and forks.—June 7.

1396. Frederick Lipscombe, of the Strand, for improvements in the construction of ships and boats.—June 7.
1399. Alexander McDougall, of Manchester, for improvements in the manufacture of potash and soda ash.—June 7.
1401. Robert Booty Cousens, of Halliford-street, Islington, for improvements in the manufacture of casks or wooden vessels. —June 7.
1402. Frederick Ludewig Hahn Danchell, of Elm Grove Villas, Acton-green, and William Startin, of Heathfield-terrace, Turnham-green, for an improved mode of obtaining auriferous deposits from the beds of rivers and lakes, and from pits containing water.—June 8.
1406. Henry Bernouilli Barlow, of Manchester, for improvements in machinery for spinning, doubling, and twisting cotton and other fibrous substances,—being a communication.—June 7.
1408. Antoine Ponçon, of Marseilles, for certain improvements in obtaining motive powor.—June 9.
1409. Claude Arnoux, of Paris, for a new system of towing and traction.—June 9.
1410. William Muir, of Manchester, for improvements in turning lathes; a part of which improvements is applicable to other useful purposes.—June 9.
1413. Edward Maniere, of Bedford-row, for improvements in the manufacture of paper.—June 9.
1414. William Brookes, of Chancery-lane, for improvements in treating fabrics suitable for floor-cloths, covers, and such like articles,—being a communication.—June 9.
1415. William Brookes, of Chancery-lane, for improvements in the manufacture of boxes and other hollow receptacles,—being a communication.—June 9.
1425. Christopher Binks, of Albert Villa, North Woolwich, for improvements in dryers, and in preparing drying oils for oil-paints, varnishes, and other uses.—June 11.
1428. William Smith, of Sheffield, for improvements in the mode of manufacturing metallic handles for knives and forks, backs for razors, bows for scissors, and the relative parts of such like instruments.—June 13.
1429. John Marsh, Theophilus Marsh, James Marsh, and Walter Marsh, all of Sheffield, for an improved mode of fastening the handles of table knives and forks.—June 13.
1430.—Joseph Spencer, of Bilston, for a new or improved cupelo.—June 13.
1431. Thomas James Perry, of the Lozells, Aston juxta Birmingham, for an improvement or improvements in raising and lowering Venetian and other blinds; applicable also to the raising and lowering of other bodies.—June 13.
1435. Robert Hopkins, of Manchester, for improvements in machinery or apparatus for cutting and shaping cork-wood and other similar substances.—June 13.

1437. William G. Craig, of Newport, Monmouth, for improvements in axle-boxes, guides, and bearings of locomotive engines and carriages; parts of which improvements are applicable to the bushes and bearings of machinery.—June 14.

1439. Joseph H. Penny and Thomas B. Rogers, of New York, for a new and useful improvement in the manner of constructing machinery for propelling vessels and other machinery, which they term a crank propeller.—June 14.

1445. Arthur Parsey, of Crescent-place, Burton Crescent, for a revolving engime to be worked by steam, air, gases, or water.—June 15.

1446. Thomas Butterworth, of Meanwood, Yorkshire, for a machine for ploughing land,—harrowing and crushing clods at one operation.—June 15.

1449. Charles Wye Williams, of Liverpool, for improvements in the manufacture of sheet iron, and of iron plates used for boilers, vessels, buildings, and other like purposes.—June 15.

1450. John Macintosh, of Pall Mall East, for improvements in the construction of portable boats or vessels and buoys.—June 15.

1457. Timoléon Zoé Louis Maurel, of Paris, for certain improvements in horological alarms.—June 15.

1459. Edward Walmsley, of Heaton Norris, and John Holmes, of Manchester, for improvements in and applicable to steam-engines.—June 16.

1461. William Christopher, of Euston-square, and Gustavus Gidley, of Hoxton, for improvements in abstracting sulphur and other matters from vulcanized India-rubber.—June 16.

1462. John Blair, of New Milns, Ayrshire, for a new and improved mode of cutting lappet cloths or other similar fabrics.—June 16.

1464. Jules Alexis Adrien Dumoulin, of Paris, for an improved instrument for measuring and tracing.—June 16.

1467. Peter Armand Le Comte de Fontainemoreau, of South-street, for an improved process for preserving milk, and its application to several organic products and alimentary substances,—being a communication.—June 16.

1468. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in the preparation of certain vegetable and alimentary substances,—being a communication.—June 16.

1477. Auguste Edouard Loradoux Bellford, of Castle-street, for an improved stove or kiln.—June 17.

1478. Robert Lister, of Scotswood, Northumberland, for improvements in chimney tops or flues.—June 17.

1479. Henry Bleasdale and Joseph Bleasdale, both of Chipping, Lancashire, for improvements in working, tilling, or preparing land.—June 17.

1484. Henry Saunders, of Yeovany, Staines, for improvements in drying grass and other crops.—June 18.

1486. Edgar Breffit, of Castleford, Yorkshire, for improvements in the manufacture of glass-house pots.—June 18.
1488. Thomas Adamson and William Adamson, of Sunderland, for improvements in pumps.—June 18.
1489. James Heginbottom and Joseph Heginbottom, of Ovenden, Yorkshire, for improvements in spinning.—June 18.
1493. James Worrall, jun., of Salford, for certain improvements in machinery or apparatus for washing, bleaching, and dyeing fustians, beaverteens, cantoons, satteens, twills, and other textile fabrics.—June 18.
1494. John Cross Richardson, of Lilly-hill, near Manchester, for certain improvements in machinery or apparatus for winding yarn.—June 18.
1495. John Cross Richardson, of Lilly-hill, near Manchester, for certain improvements in looms for weaving.—June 18.
1496. George Robinson, of Manchester, for certain improvements in apparatus for roasting and desiccating coffee, cocoa, and chicory.—June 18.
1499. Charles Crickmay, of Handsworth, for improvements in the construction of fire-arms.—June 20.
1500. John Paul, of Manchester, for coloring paper on the surface.—June 20.
1501. Robert Midgley, of Northowram, Yorkshire, for improvements in preparing and finishing certain worsted yarns, and in apparatus employed therein.—June 20.
1502. Hiram Barker and Francis Holt, both of Manchester, for improvements in machinery and apparatus for grinding and turning metals.—June 20.
1503. William Boggett, of St. Martin's-lane, and George Brooks Pettit, of Lisle-street, for improvements in dioptric refractors.—June 20.
1505. John William Perkins, of Narrow-street, Limehouse, for improvements in the manufacture of artificial manure.—June 20.
1510. Robert Galloway, of Cartmell, Lancashire, for improvements in manufacturing and refining sugar.—June 20.
1512. Joseph Skertchly, jun., of Kingsland, for improvements in the application of baths to articles used for resting the human body.—June 20.
1513. Pacifique Grimaud, of Paris, for a new ærogaseous drink, which he calls "grimaudine."—June 20.
1514. Henry Blatin, of Rue Bonaparte, Paris, for improvements in buckles.—June 20.
1515. Charles Cowper, of Southampton-buildings, for improvements in the manufacture of cards, or substitutes for cards for the Jacquard loom,—being a communication.—June 21.
1521. John Henry Noone, of Salisbury-street, Portman-market, for an improved method of stopping railway trains and preventing railway accidents.—June 22.

1522. Frederick Ayckbourn, of Guildford-street, Russell-square, for improvements in the manufacture of waterproof fabrics.—June 22.
1525. Charles Topham, of Hoxton, for improvements in apparatus for measuring liquids, gases, and other elastic fluids, and for regulating the flow thereof; which apparatus may also be applied to the obtaining of motive power.—June 22.
1527. Noel Natalis du Chastaingt, of Paris, for an improvement in bread making.—June 23.
1530. Thomas Weatherburn Dodds, of Rotherham, for improvements in the manufacture of files, rasps, and other edge tools usually made of steel.—June 23.
1531. Peter Armand Le Comte de Fontainemoreau, of South-street, for a new distilling apparatus,—being a communication.—June 23.
1534. Joshua Horton, jun., of Staffordshire, for an improvement or improvements in steam-boilers.—June 24.
1544. John Lyle, of Glasgow, for improvements in the manufacture of figured or ornamental fabrics.—June 24.
1546. Leon Valls, of Paris, for improvements in the production of printing surfaces,—being a communication.—June 24.
1547. Daniel Illingworth, Alfred Illingworth, and Henry Illingworth, of Bradford, Yorkshire, for improvements in machinery or apparatus for combing wool, cotton, flax, silk, and other fibrous substances.—June 25.
1548. Antoine Andraud, of Paris, for certain improvements in railways and locomotives running thereon; which improvements facilitate the ascension of steep inclines.—June 25.
1552. Robert Harlow, of Stockport, for improvements in constructing and working valves for baths, washstands, and other purposes.—June 25.
1555. John Mason, of Rochdale, and Luke Ryder, of the same place, for improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.—June 27.
1569. John Imray, of Lambeth, for improvements in obtaining motive power.—June 29.
1580. Edward Davies, of Gothenburg, Sweden, for improvements in machinery or apparatus for carding and otherwise preparing cotton or other fibrous materials to be spun, and also for cleaning or stripping cards used in the said operations.—June 30.
1583. Richard Bradley and William Craven, of Wakefield, for improvements in the moulding, forming, and compressing of clay for the manufacture of bricks, tiles, and other earthenware.—July 1.
1585. John Getty, of Liverpool, for certain improvements in ship-building.—July 1.
1587. Edward Clarence Shepard, of Trafalgar-square, for improvements in magneto-electric apparatus, suitabie for the pro-

duction of motive power of heat and of light,—being a communication.—July 1.

1591. Edward Clarence Shepard, of Trafalgar-square, for improvements in the manufacture of gas,—being a communication.—July 1.

1596. François Mathieu de Amezaga, of Bordeaux, for a method of obtaining motive power, and certain machinery or apparatus employed therein.—July 4.

1603. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improved machinery for printing—being a communication.—July 5.

1629. Jacob Brett, of Hanover-square, for improvements in photography.—July 8.

1634. James Parkes and Samuel Hickling Parkes, both of Birmingham, for improvements in the manufacture of certain drawing or mathematical instruments; also in packing or fitting the same in their cases; which said improvements in packing or fitting are also applicable to the packing or fitting of other articles.—July 9.

1635. Thomas Restell, of the Strand, for improvements in walking-stick umbrellas, applicable also to parasols.—July 9.

1657. Martin Samuelson, of Hull, for improvements in the manufacture of bricks and other articles from plastic materials.—July 12.

1659. William Francis Snowden, of Weymouth, for an improved mangle.—July 12.

1669. William Needham, of Smallbury-green, and James Kite, jun., of Lambeth, for improvements in machinery and apparatus for expressing liquid or moisture from substances.—July 14.

1676. Robert Smith Bartleet, of Redditch, for improvements in the manufacture of sewing-machine needles.—July 14.

1702. James Naylor, of Hulme, for improvements in lamps.—July 16.

1715. John Robison, of Coleman-street, for a new or improved apparatus for making tea and coffee and other infusions or decoctions for chemical and other purposes.—July 20.

1726. William Thorp, of Collyhurst, near Manchester, for certain improvements in machinery for finishing and embossing plain and fancy woven fabrics.—July 21.

1765. John Knowles, of Manchester, for certain improvements in looms for weaving.—July 27.

1781. William Woods Cook, of Bolton, for improvements in the manufacture of woven fabrics and in the apparatus employed therein.—July 30.

1801. John Griffiths, of Stepaside, Saunderfoot, near Tenby, for certain improvements in steam-engines.—August 2.

1816. John Macintosh, of Pall Mall, for improvements in the construction of bridges, viaducts, and other like structures.—August 3.

1836. William Newton, of the Office for Patents, Chancery-lane, for improvements in the process of coating cast-iron with other metals and the alloys of other metals,—being a communication.—August 5.

1851. Thomas Young Hall, of Newcastle-upon-Tyne, for improvements in safety-lamps; part or parts of such improvements being applicable to the consumption or prevention of smoke, and for the purposes of ventilation generally.—August 9.

1874. George Deards, of Harlow, Essex, for improvements in lamps.—August 11.

1857. George Parsons, of West Lambrook, for improvements in steam-engines and boilers.—August 9.

1896. John Clegg Boond, of Manchester, for certain improvements in Jacquard apparatus.—August 13.

1910. Archibald Douglass, of Norwich, for improved machinery for stitching, back-stitching, and running.—August 15.

1911. Richard Archibald Brooman, of Fleet-street, for a method of, and machinery for, reducing wood and other vegetable fibres to pulp, applicable to the manufacture of paper, paste-board, mill-board, papier-maché, mouldings, and other like purposes,—being a communication.—August 15.

1936. William Curtain, of Retreat-place, Homerton, for improved machinery for printing textile fabrics, oil-cloths, leather, paper-hangings, and other similar fabrics or materials.—August 18.

1949. Alexander Cuninghame, of Glasgow, for improvements in the manufacture or production of alkalis and their salts, or alkaline salts.—August 20.

1962. Thomas Herbert, and Edward Whitaker, both of Nottingham, for improvements in warp machinery employed in the manufacture of purled and other fabrics.—August 23.

1970. Thomas Hill and Alexander Thomson, both of Glasgow, for improvements in the manufacture of pipes or hollow articles from plastic materials.—August 24.

1975. Charles Collyford Banks, of Clapham, for improvements in lubricators.—August 24.

1993. Samuel Taylor, of Manchester, for improvements in apparatus for generating and applying carbonic acid gas.—Aug. 27.

2001. Edward Patrick Gribbon, of Dublin, for improvements in window-frames and sashes.—August 29.

2006. Charles Goodyear, of Avenue-road, St. John's-wood, for improvements in the manufacture of waterproof fabrics.—August 30.

2039. Gage Stickney, of Hanover-street, Pimlico, for an improved construction of blower,—a communication.—Sep. 3.

2052. James Davis, of the Low Furness Iron Works, near Ulverstone, and Robert Ramsay, of the same place, for an improved engine to be worked by steam, air, or water.—September 6.

2075. Edwin Lumby, and Zacchœus Sugden, of Halifax, for improvements in needles or wires, used in the manufacture of carpets, looped pile fabrics, and velvets.—September 9.

2087. Robert Drew, of Bath, and John Bayliss, of Birmingham, for improvements in stay and other like fastenings.—Sep. 9.
2095. Thomas William Gilbert, of Limehouse, for improvements in sewing sails and other articles.—September 10.
2108. Joseph Maudslay, of Lambeth, for improvements in boilers and furnaces for generating steam.—September 12.
2110. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved manufacture of printing blocks and cylinders,—being a communication.—September 12.
2113. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improved machinery for crushing and grinding mineral and other substances,—being a communication.—September 12.
2117. Adolphus Sington, of Manchester, for certain improvements in machinery or apparatus for grinding or setting doctors, used in calico and other similar printing machinery,—being a communication.—September 13.
2120. Jacob Behrens, of Bradford, Yorkshire, for improvements in the manufacture of zinc,—being a communication.—September 13.
2121. William Smith, of Little Woolstone, Bucks, for improvements in implements for tilling and preparing land for crops.—September 13.
2122. Emerson Goddard, of New York, for improvements in machinery for cutting stone.—September 13.
2123. Moses Poole, of the Avenue-road, Regent's-park, for improvements in apparatus and means for removing matters or heat from currents of air, gases, or vapours, or from liquids, and for communicating matters or heat to the same,—being a communication.—September 13.
2124. Richard Laming, of Millwall, Poplar, for an improved process for purifying gas.—September 13.
2126. John Wilson, of Manchester, for improvements in, and applicable to, machines for printing fabrics.—September 14.
2133. Charles Townsend Hook, of Tovil House, Maidstone, for improvements in the manufacture of pulp.—September 14.
2134. Richard Dugdale Kay, of Bank-terrace, Accrington, for improvements in block printing.—September 14.
2135. Moses Poole, of Avenue-road, Regent's-park, for improvements in machinery for separating flour shorts and dustings from bran as it comes from the bolting apparatus,—being a communication.—September 14.
2136. George Spencer, of Cannon-street West, for improvements in supporting rails of railways.—September 14.
2137. Jacob Behrens, of Bradford, Yorkshire, for improvements in generating steam in steam-boilers,—being a communication.—September 14.
2138. Thomas Swingler, of Victoria Foundry, Litchchurch, for improvements in the permanent way of railways.—Sept. 14.

2148. Moses Poole, of Avenue-road, for improvements in distributing printers' type,—being a communication.—Sept. 15.

2149. Sydney Smith, of Hyson-green Works, near Nottingham, for improvements in governors for steam-engines.—Sept. 15.

2150. John Barsham, of Kingston-upon-Thames, for improvements in the manufacture of bricks, tiles, and blocks.—September 15.

2151. Francis Higginson, of King William-street, for effecting certain improvements in the means of setting in motion and propelling ships, vessels, and boats of every description, upon seas, rivers, canals, and inland waters.—September 16.

2170. Edward Thomas, of Belfast, for an improvement in the construction of looms for weaving.—September 18.

2179. Aristide Michel Servan, of Philpot-lane, for improvements in distilling fatty and oily matters.—September 20.

2180. Moses Poole, of Avenue-road, for improvements in life-preservers,—being a communication.—September 20.

2185. Joseph Gibbs, of Abingdon-street, for improvements in the treatment of minerals for the purpose of separating impurities therefrom.—September 20.

2187. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved method of forming seams and ornamental stitching, and in machinery for effecting such operation; part of which machinery is applicable to the forming of other seams and stitches,—being a communication.—September 21.

2188. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved mode of constructing steam-boilers; applicable also in part to the construction of condensers,—being a communication.—September 21.

2192. Peter Rothwell Arrowsmith and James Newhouse, both of Bolton-le-Moors, for certain improvements in machines for spinning and doubling.—September 22.

2203. Hiram Tucker, of Massachusetts, U. S., for a new and useful improvement in the art or process of applying colors to a surface by means of a liquid.—September 24.

2205. William Farmer, of Fulham Brewery, for improvements in apparatus for preserving provisions.—September 24.

2208. James Smith, of Law-hill, Perthshire, for improvements in scythes.—September 26.

2211. Henry Winter, of Castle-street, for an improvement in trousers to supersede the use of braces; which improvement is applicable to other articles of apparel.—September 26.

2216. William Prior Sharp, John Hill, the younger, and William Martin, all of Manchester, for improvements in machinery for spinning and doubling cotton and other fibrous substances.—September 27.

CELESTIAL PHENOMENA FOR JANUARY, 1854.

D.	H.	M.	
1			Clock before the ☉ 3m. 51s.
	—		☽ rises 10h. 25m. M.
	—		☽ passes mer. 2h. 27m. A.
	—		☽ sets 6h. 50m. A.
	2	7	☉ in Perigee
	23	53	♀ in conj. with the ☽ diff. of dec. 4. 45. N.
	—		Occul. 33 Capricorni, im. 4h.59m. em. 5h. 53m.
4			Occul. 33 Piscium, im. 5h. 6m. em. 6h. 16m.
5			Clock before the ☉ 5m. 42s.
	—		☽ rises 11h. 44m. M.
	—		☽ pass mer. 5h. 46m. A.
	—		☽ sets 11h. 59m. A.
6	3	48	☽ in □ or first quarter
7			Occul. *x* Arietis, im. 5h. 49m. em. 7h. 8m.
		39	♀ in the ascending node
	11	7	♅ in conj. with the ☽ diff. of dec. 2. 29. N.
	12		Pallas in conj. with ☿ diff. of dec. 27. 8. N.
	16	20	☿ in the dsscending node
8	22	25	♄ in conj. with the ☽ diff. of dec. 0. 49. S.
9			Occul. w^1 Tauri, im. 12h. 59m. em. 13h. 22m.
10			Clock before the ☉ 7m. 50s.
	—		☽ rises 1h. 11m. A.
	—		☽ pass mer. 9h. 24m. A.
	—		☽ sets 4. 42. M.
	—		Pallas greatest hel. lat. N.
	23		☽ in Apogee
11			Occul. 132 Tauri, im. 11h. 55m. em. 12h. 57m.
12	12		♂ greatest hel. lat. N.
13	12		Ceres in conj. with ☿ diff. of dec. 0. 56. S.
14			Vesta stationary
	—		Occul. γ Cancri, im. 20h. 51m. em. 20h. 51m.
	9	11	Ecliptic oppo. or ○ full moon
	23	41	☿ in conj. with ♃ diff. of dec. 0. 53. S.
15			Clock before the ☉ 9m. 44s.
	—		☽ rises 5h. 17m. A.
	—		☽ pass mer. 0h. 44m. M.
	—		☽ sets 9h. 6m. M.
16			Occul 42 Leonis, im 19h. 31m. em. 20h. 4m.
	—		Mercury, R. A., 18h. 51m. dec. 23. 54. S.
	—		Venus, R. A., 22h. 41m. dec. 6. 51. S.
	—		Mars, R. A., 11h. 19m. dec. 8. 15. N.
16			Vesta, R. A., 11h. 5m. dec. 13. 10. N.
	—		Juno, R. A., 11h. 53m. dec. 2. 42. S.
	—		Pallas, R. A., 18h. 8m. dec. 4. 1. N.
	—		Ceres, R. A., 18h. 39m. dec. 24. 52. S.
	—		Jupiter, R. A., 18h. 45m. dec. 23. 1. S.
	—		Saturn, R. A., 3h. 32m. dec. 17. 0. N.
	—		Uranus, R. A., 2h. 25m. dec. 13. 59. N.
	—		Mercury pass mer. 23h. 11m.
	—		Venus pass mer. 2h. 59m.
	—		Mars pass mer. 15h. 34m.
	—		Jupiter pass mer. 23h. 0m.
	—		Saturn pass mer. 7h. 48m.
	—		Uranus pass mer. 6h. 42m.
	10	48	♅ stationary
17	20	16	☿ in Aphelion
18			Occul. ν Virginis, im. 11h. 38m. em. 12h. 47m.
	3	39	♂ in conj. with the ☽ diff. of dec. 1. 38. S.
	14	22	♂ stationary
20			Clock before the ☉ 11m. 20s.
	—		☽ rises 10h. 27m. A.
	—		☽ pass mer. 4h. 35m. M.
	—		☽ sets 10h. 44m. M.
	—		Occul. 66 Virginis, im. 13h. 40m. em. 14h. 45m.
	—		Occul. l^2 Virginis, im. 18h. 43m. em. 19h. 34m.
22			Occul. r^1 Libræ, im. 13h. 46m. em. 14h. 22m.
	—		Juno stationary
	1	23	☽ in □ or last quarter
23			Occul. w_1 Scorpii, im. 14h. 56m. em. 15. 38.
	18	19	♀ at greatest brilliancy
24	10	17	Ceres in conj. with ♃ diff. of dec. 1. 58. S.
25			Clock before the ☉ 12m. 38s.
	—		☽ rises 4h. 59m. M.
	—		☽ passes mer. 8h. 53m. M.
	—		☽ sets 0h. 42m. A.
26	6	48	♄ stationary
	11	23	♃ in conj. with the ☽ diff. of dec. 2. 5m.
	14		☽ in Perigee
27	14	39	☿ in conj. with the ☽ diff. of dec. 2. 7. N.
28	5	12	Ecliptic conj. or ● New Moon
	8	49	♅ in □ with the ☉
30	13	55	♀ in conj. with the ☽ diff. of dec. 9. 53. N.

The Eclipses of Jupiter's Satellites are not visible until the 21st day of this month,—Jupiter being too near to the Sun; and then not visible at Greenwich to the end of the month.

J. LEWTHWAITE, Rotherhithe.

THE

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No. CCLXVI.

RECENT PATENTS.

To James Bristow, *of Bouverie-street, miller, and* Henry Attwood, *of Holland-street, Blackfriars-road, engineer, for their invention of improvements in the means of consuming smoke.*—[Sealed 29th April, 1853.]

This invention relates to a mode of constructing or arranging the flues of steam-boiler and other furnaces, when two or more are set side by side, or brought into connection with each other, so that the smoke or gases of combustion given off from one furnace may be conducted over the bright fire of another furnace, and be thereby consumed. This object is effected by bringing the several adjacent furnaces into communication with a common flue, provided with dampers, which will permit of a temporary connection being set up between any two furnaces in the range. Thus, when fresh fuel is thrown on to one of the furnace fires, by diverting the course of the gases generated in that furnace, and causing them to enter the common flue (which diversion may be effected by closing the damper in the exit flue of the smoking furnace), the smoke and gases may be conducted into a furnace having a bright fire, and be there consumed. When smoke ceases to be given off from the recently charged fireplace, the gases of combustion are turned into their proper channel and allowed to escape into the chimney.

In Plate III., fig. 1, shews, in sectional elevation, and fig. 2, in sectional plan, the manner of connecting together a series of steam-boiler furnaces, according to this invention. *a, a,* are the boilers, which are severally set in brickwork, which

forms a flue *b*, around them of the ordinary kind. Into this flue the flame and heated gases from the fire-place *c*, pass, by a flue *d*, which runs under the boiler; and the gases having circulated through the flue *b*, escape into a common flue *e*, at the back of the furnaces, and finally make their exit at the chimney *f*. Immediately over the fire-place *c*, in each furnace, is an opening, which leads to a flue *g*, formed in the brickwork, and running from end to end of the series of furnaces. These several openings are commanded by a sliding door or damper *h*, which, when closed, cuts off the communication between the several furnaces and the flue *g*. The flues *b*, near that end which connects with the common flue *e*, at the back of the furnaces, are likewise severally provided with a damper *i*, for cutting off the communication between their respective furnaces and the flue *e*. These dampers *i*, are each suspended by a chain *k*, which passes over carrier-pulleys, and is thereby brought to the front of the furnace, to enable the attendant to raise and lower the dampers with facility.

Supposing now a bright fire to be burning in, say, furnace No. 1, and a fresh charge of coals to be required in furnace No. 2, the attendant will, prior to throwing on the coals, close the damper *i*, of the latter furnace, and open the damper *h*, of both furnaces; whereby the smoke, arising from the fresh charge, will be diverted from its usual course towards the chimney, and thrown back to the front of the furnace. A communication being now established between the furnaces Nos. 1, and 2, the smoke will pass from the latter into the fire-place *c*, of the former—which contains, as was said, a bright fire—and it will be there consumed. When smoke is no longer given off by the fire in the furnace No. 2, the damper *i*, of that furnace is to be opened; and, supposing the fire to be now burning brightly in this furnace, and a fresh supply of coals to be required for furnace No. 3, the damper *i*, of the latter furnace is to be closed, and a communication established (in like manner to that just described) between furnaces Nos. 2, and 3,—the damper *h*, of furnace No. 1, being closed, to cut off the connection between that furnace and the common flue *g*, It will thus be understood, that any two furnaces of a series can be connected together, at pleasure, for the purpose of diverting the smoke, generated in one furnace, on to the bed of bright coals in an adjacent furnace, and thereby effecting the combustion of the smoke. Instead of employing a flue, built up in the brickwork, for producing a passage of communication between the fire-places

of several furnaces, iron or other tubing, having short branch pipes leading to the several furnaces, may, with advantage, be used; especially when the invention is required to be applied to furnaces already constructed.

The patentees state, that they lay no claim to the broad principle of diverting the smoke and heated gases generated in one furnace and passing them under or over the bright fire in an adjacent furnace; but they claim the means, hereinbefore described, by which any two of a series of furnaces may be readily brought into connection with each other, for the purpose of effecting the combustion of the smoke given off from the successive charges of coal supplied to such furnaces.

To WILLIAM WILKINSON, *of Nottingham, framework knitter, for improvements in taps and other apparatus for filtering and drawing off liquids.*—[Sealed January 1st, 1853.]

THIS invention consists, firstly, in manufacturing cocks, taps, and other similar apparatus for drawing off liquids, of glass, or of a combination of metal and glass, according to the purposes to which such articles are to be applied. In constructing a glass tap the patentee takes a quantity of molten glass, and presses it in suitable moulds. The passage for the liquid may be either blown in the usual manner in forming articles of glass, or it may be bored out after the tap or cock has been cast and properly annealed. The plug is formed separately and carefully ground into the "keyway," and secured in its place by a metal nut. The cap may be made of metal, if found desirable.

Secondly, this invention consists in certain methods for admitting air into a cask containing liquid, when it is desired to draw off the whole or any portion thereof; such apparatus being opened or closed by the plug of the tap. In Plate III., fig. 1, represents a method for effecting this object. A, is a section of part of a barrel; B, is the tap for drawing off the liquid; and C, the plug. D, is a small metal tube, which is screwed into the upper part of the barrel, and communicates with the interior thereof. E, is a plug, which is passed through the upper part of the tube D, and has drilled through it a hole of about the same diameter as the interior of the tube This plug has formed upon one end of it the eye *a*, to which is fastened the one end of a cord or wire F, which is continued along the top of the barrel and passed through the eye *b*, and brought down the front of the barrel, and again passed through

a second eye *c*, and is finally secured to the plug C. When it is desired to draw off the liquid contained in the barrel, by turning the plug of the tap, such action partially winds the end of the string around it, and so causes the plug E, of the small tube D, to be drawn forward until the hole in the plug coincides with the bore of the tube, when air is immediately admitted into the interior of the barrel, and the drawing off of the liquid is accelerated. *f*, is a collar upon the plug E, to prevent it from being drawn too much out of the tube. When sufficient liquid has been drawn off, and the plug C, turned, so as to cut off any further flow of the liquid, the plug E, is drawn back into its former position, by means of an India-rubber or other suitable spring G, which is attached to the plug and barrel, whereby the admission of air into the barrel is prevented. Fig. 2, represents another method of admitting air, by means of air tubes passed through the tap, and communicating with the barrel at one end, and at the other with orifices cut through the plug of the tap, and opening into the atmosphere. These tubes are closed by valves *a*, opening into the barrel; so that when the plug is turned, for drawing off the liquid, such action shall open the orifices in the plug, and admit the air into the barrel. The valves *a*, prevent the outflow of the liquid.

Thirdly, this invention has relation to an improved filtering vessel, composed of wood, glass, metal, or of a combination of either of such substances. This filter may be either placed inside a barrel or cask containing wines, beers, and other liquids, and in communication with the tap or cock, so as to filter the liquid as it is drawn off; or the filter may be used separately, and applied to the filtering of dyes and other liquids. Fig. 3, represents an improved filter, shewn applied to a barrel. A, A, is an outer cylinder, composed of any suitable material, and perforated with holes, to allow the liquid to percolate through to the interior. This cylinder is filled with perforated discs, covered with one or more thicknesses of linen or other textile fabric. The tap B, for drawing off the liquid is placed in communication with the filter, as shewn. Fig. 4, represents this filter, applied to the filtering or cleansing of dyes and other similar liquids. A, is the cylinder, which, for liquids containing any acid, should be formed of wood or other substance not acted upon by the acid. This cylinder is perforated, and filled with perforated discs, as before explained, and is supported upon the ring *a, a*, held in the centre of the reservoir or cask B, by the projecting arms *d, d*. The liquid to be filtered is poured into the upper and open

portion of the filter, and gradually percolates into the interior of the reservoir B, from which it may be finally drawn off by the cock C. When the filter has become too much clogged up with impurities, the discs may be taken out and washed, when it will be again ready for use.

The patentee claims, First,—the construction of cocks, taps, and other similar apparatus for drawing off liquids, of glass, or of a combination of metal and glass, as hereinbefore described. Secondly,—the arrangements for admitting air into the interior of casks or barrels containing liquid to be drawn off, as hereinbefore described, and represented in figs. 1, and 2. And, Thirdly,—the improved filtering vessel, constructed in the manner hereinbefore described, and represented in figs. 3, and 4.

To JOHN BENNETT, *of Bradley Mills, Huddersfield, woollen manufacturer, and* HENRY CHARLESWORTH, *of Huddersfield, card-manufacturer, for improvements in doffing and preparing rovings of wool.*—[Sealed 12th January, 1853.]

THIS invention consists in employing only one doffing-cylinder to a carding and condensing-engine,—such cylinder having a rotatory motion, but no traversing action. The doffing-cylinder is covered all over with sheet-cards or fillet-cards, and the wool is fed into the carding-engine in separate slivers, which pass through it in the same condition without taking wool or giving it to each other. The rubber consists of two sheets of leather, as heretofore; or other condensing apparatus may be used. It has heretofore been usual to employ, in carding and condensing-engines, when slivers have been fed into the same, thin pieces of metal to divide the width of the machine into numerous spaces, to guide the several slivers into the machine, and, by thus keeping them, to some extent, separated, to cause the feeding at all parts across the machine to be as uniform and equal as may be; but such separation of the several slivers has not prevented the fibres at the edges of the neighbouring slivers coming together, and producing a sheet of sliver across the machine; which, in doffing, has required to be again divided into narrow slivers by means of the rings or separate bands of the cards on the doffing-cylinders, which, but for the form and mode of working of the doffer-cylinders, would not be doffed in separate slivers. Now, according to this invention, only one doffing-cylinder is employed, and that cylinder does not require to be prepared with rings or separate bands of cards, but is merely

covered with wire cards, and simply rotates, and has no traversing motion. The results attained are consequent on the so feeding the slivers into a carding and condensing-engine, that each sliver is separated from its neighbours, and continues to be so throughout the process; and this is accomplished, when feeding numerous narrow slivers into a carding and condensing-engine, by employing separating guides, at such a distance apart that the fibres composing one sliver will not mix with a neighbouring sliver or slivers. For this purpose it is necessary to have the several slivers fed into the machine (whether from beams or bobbins) at spaces apart further than that which results from the simple interposition of a piece of thin sheet metal between each two neighbouring slivers; which narrow pieces of metal have heretofore occupied a comparatively small proportion of the width of a machine, and the numerous slivers have nearly occupied the whole width of the machine or engine.

In carrying out this invention, the spaces between neighbouring slivers may vary, so long as the space, in each case, is such as to ensure each sliver pursuing its course through the machine without adding to, or being robbed by, neighbouring slivers; and, for this purpose, it is found that, by having the spaces between each two neighbouring slivers twice as wide as the narrow space between which a sliver is fed, these objects are advantageously accomplished.

In preparing for spinning fine yarn, the machines are sixty inches wide, having forty-eight narrow openings to receive and guide as many slivers into the machine. By this arrangement the several slivers will be received on to the doffing-cylinder separate from each other, and will be removed therefrom in the ordinary manner, and subjected to the rubbing process between two endless leathers, as is well understood, or be otherwise condensed into rovings. The patentees remark, that although they ordinarily cause a single sliver to be fed into the machine through each narrow guiding space, still two or more slivers may be fed through each guiding space; but, in these cases, the two or more slivers will be delivered as, and will become, one roving.

To George Henry Brockbank, *of Crawley-street, Oakley-square, for improvements in horizontal piano-fortes.*—[Sealed 4th April, 1853.]

This invention consists in applying an additional wrest-plank, in combination with the one now in use, together with metal

bars,—the wrest-pins being caused to pass through and rest within the additional wrest-plank (which it is preferred should be of metal), and being held firmly in the ordinary wrest-plank, as formerly.

In Plate IV., fig. 1, is a plan of the wrest-plank, through which the wrest-pins pass; and fig. 2, is a transverse section of the two wrest-planks. *a*, is the ordinary wrest-plank, into which the wrest-pins are fixed; *b*, is the additional wrest-plank, through which the wrest-pins pass, and within which they rest, as is shewn; *c*, *c*, are metal bars, to receive and resist the pressure of the additional wrest-plank *b*.

The patentee claims the application of an additional wrest-plank, placed above the ordinary wrest-plank,—causing the wrest-pins to pass through and rest within the additional wrest-plank; so that the strings pass between the two wrest-planks.

To George Robb, *of Glasgow, veterinary surgeon, for improvements in the manufacture of sulphuric acid, alkalis, and their salts.*—[Sealed 2nd April, 1853.]

This invention relates to the manufacture of sulphuric acid, sulphate of soda, sulphate of potash, and sulphurets of sodium and potassium and their carbonates, so as to secure superior economy in the several processes. In making sulphuric acid, the vapour of sulphurous acid is passed over or in contact with the peroxide of iron, manganese, or other metals, with or without the addition of clay or alumina, mingled with heated air; and this produces sulphuric acid. But, in order to obtain the essentially necessary superior heat, carbonic oxide in a state of combustion, or the products of combustion of any clear bright burning body, are passed through the materials, so as to ensure a superior result. To produce sulphates of soda and potash, the sulphurous acid is passed along, with heated air and steam, over a mixture of common salt or chloride of potassium and peroxide of iron, manganese, or other oxide, and with or without clay or alumina, as hereinbefore mentioned,—the direct heat of any clear burning body, as hereinbefore mentioned, being also used in this part of the process. In making the sulphurets of sodium and potassium, for the production of the carbonates of soda and potash, the sulphates of soda and potash are mixed with the sulphates of lime, barita, strontia, magnesia, or other sulphates, or the sulphurets of these bodies, or soda waste, either individually or mixed. The carbonic acid gas may be obtained from bi-

carbonate of soda or potash which has been made with carbonic acid by a process of combustion.

In employing oxide of iron, for the production of sulphuric acid, the patentee employs, by preference, the pyrites cinder, resulting from the combustion of iron pyrites, as commonly produced in the manufacture of sulphuric acid. When oxide of manganese is used, any of the ordinary manganese ores of commerce may be thus employed. The pyrites cinder or oxide of manganese is first reduced to a coarse powder, and it is then commingled with about from one-fifth to one-tenth of its weight of common clay or argillaceous earth; or, instead of this added matter, alumina may be used. The compound so formed is then made up into a paste with water, when it may be moulded into balls, bricks, or suitable manageable masses. As the special nature of the incorporated materials necessarily varies occasionally, the proportions, above stated, are also equally variable; and, in some instances, a quantity of ground coke or charcoal, or small coal, is mixed in the mass; so that, as this carbonaceous addition burns out in the subsequent calcination of the balls, the masses will be left in a more highly porous condition, and better suited for the purpose intended. Such bricks or masses are then dried in a common stove, until they are hard and difficult of fracture. In this state they are placed in a furnace resembling an ordinary lime kiln, or what is technically known in Scotland as a "draw kiln." Round this kiln are ranged a set of pyrites burners, such as are in ordinary use by sulphuric acid makers. These burners are so arranged, that all the products of the combustion effected in them may pass into the composition kiln. Common pyrites is deposited in these burners, and roasted in the usual manner,—highly heated atmospheric air being, at the same time, admitted at the bottom of the composition kiln. By this arrangement the sulphurous acid vapour and the oxygen of the atmosphere, being simultaneously brought into contact with the composition masses or bricks at a dull red heat, the resultant combination forms sulphuric acid. During this process carbonic oxide, or other cheap combustible gas, may be advantageously introduced at different parts of the composition kiln, so that the kiln may be still better heated throughout. The admission of surcharged or super-heated steam is also advantageous; and, instead of using pyrites in this way, as the source of sulphurous acid, sulphur, sulphuretted hydrogen, or artificial sulphuret of iron, is employed; or the sulphurous acid employed may be obtained from any known source. In making sulphate of

soda, by passing sulphurous acid over oxide of iron, or manganese and common salt mixed together, and retained at a dull red heat, the preferable oxide of iron is the spent cinder from pyrites burners; or manganese, which may be used over and over again, may be similarly employed. The salt and oxide is made up into balls or bricks with clay or alumina, and introduced into a kiln, of the kind already described, —the sulphurous acid being passed through them Any artificial mode of heating may be used; but in case of pyrites this is unnecessary. The whole of the common salt is readily decomposed in this way. If steam or moisture is admitted into the kiln, along with the atmospheric supply, muriatic acid is given off; but if the air and materials are thoroughly dry, chlorine gas is evolved by the process.

In manufacturing carbonate of soda, a sulphuret of sodium is first produced, and then decomposed by the action of carbonic acid. The ordinary sulphate of soda is, in this process, decomposed by the action of suitable carbonaceous material, in a kiln or common furnace; but to the sulphate of soda a portion of sulphate of barytes, or strontian, or lime, or magnesia, or other sulphate or sulphuret is added; or else a mixture of these materials, or ordinary vat waste from the alkali makers, mixed with one or other of these compounds. By the agency of such additions, a sulphuret of sodium is obtained, which does not corrode the furnace or the iron tools nearly so rapidly as when the sulphate of sodium is decomposed by itself with carbonaceous materials; and it is with this object these hereinbefore-described mixtures are used. The result of this process is, that an easily lixiviable mass is obtained, and the residue may be continuously used over and over to assist in the decomposition of fresh sulphate of sodium. Such sulphuret may be decomposed by the action of bicarbonate of soda, according to the process for which letters patent for England were granted to Mr. J. Wilson, in the year 1840. But the patentee especially uses the bicarbonate of soda, as a source of carbonic acid, for effecting the decomposition of sulphuret of sodium,—placing the bicarbonate of soda in a separate vessel or chamber, and generating the carbonic acid by the agency of heat. The bicarbonate may be produced by causing the common carbonate of soda to absorb the products of the combustion of carbonaceous materials. In practising this process, the sulphuretted hydrogen evolved may either be turned into sulphurous acid, for the production of sulphuric acid, or its sulphur may be recovered by heating it to redness, or by passing it into a

chamber where it meets with sulphurous acid. Or it may be made available by other known methods, which must be obvious to the practical chemist.

The patentee claims, First,—the general arrangements and means for manufacturing sulphuric acid, alkalis, and their salts, as hereinbefore described. Secondly,—the application and use of powdered pyrites cinder, oxide of iron, or oxide of manganese, formed into masses, with clay or alumina, for the purposes hereinbefore described. Thirdly,—the system or mode of keeping up the heat of the kiln or furnace by the use of heated air, by carbonic oxide, or other cheap combustible gas, or heated products of combustion. Fourthly,—the decomposition of common salt in a state of admixture with oxide of iron, pyrites cinder, or oxide of manganese, by passing the vapour of sulphurous acid through such compound. Fifthly,—the system or mode of operating upon pyrites for the production of sulphuric acid, wherein the heat employed is solely derived from the combustion of the pyrites. Sixthly,—the application and use of bicarbonate of soda as the source of carbonic acid for effecting the decomposition of sulphuret of sodium, and the mode, hereinbefore described, of decomposing the sulphuret of sodium. And, Seventhly,—the application and use of sulphates of lime, and the other agents hereinbefore mentioned, in the reduction of sulphate of soda to sulphuret of sodium; whereby an easily workable mixture is obtained.

To HENRY OLIVER ROBINSON, *of Moorgate-street, for improvements in machinery for crushing sugar-canes.*—[Sealed 8th April, 1853.]

THIS invention consists, first, in constructing a steam-engine with the gear to connect it to a sugar-cane mill in such a manner that the engine and gear are placed together upon a base-plate common to both, and also in such a manner that the end of the said base-plate may be connected with the base-plate of any sugar-cane mill by screw-bolts and nuts, whether the latter be specially adapted to it or not; so that a steam-engine and gear upon this construction, may be attached to any sugar-cane mill already in existence, by screw-bolts and nuts, whether to replace a worn-out steam-engine, a water-wheel, or other motor.

Second, in a new kind of coupling or clutch, consisting of a disc of iron formed with a groove on each of its flat sides at right angles to each other; the one groove being to receive

the end of the connecting gear shaft, which is formed in a tongue to fit into it, and the other groove to receive a tongue formed upon the shaft of the top roller of the mill. The effect of this coupling is to permit of a deviation in the line of the said connecting shaft, and the top roller shaft respectively, without danger to the machinery from straining of the parts, and also to permit of the top roller being lifted up occasionally (as is often necessary) without disturbing the connecting gear shaft or engine shaft.

In Plate III., fig. 1, is an end elevation of the machinery; fig. 2, shews part of the gearing between the steam-engine and the rollers; and figs. 3, shew different views of the coupling applied between the axis of the sugar mill and the gearing of the steam-engine. C, C, C, is the steam-engine; the fly-wheel being elevated so as not to cut off the continuity of the base-plate. D, D, D, is the connecting gear, consisting of two wheels, and two pinions, with their shafts and framings to carry them; the wheels being elevated so as not to cut off the continuity of the base-plate. A, B, is the base-plate common to both. E, E, E, is a sugar-cane mill of the ordinary construction, to which the base-plate is shewn to be united. H, H, is the clutch coupling (or new universal joint), shewing front and back views of it, and the grooves crossing each other. *f*, and *g*, are the inside geared pinion and wheel, part of a detached front view of which is shewn at fig. 2.

Since the discovery that a very slow motion of the rollers is the only true mode of obtaining an effective operation of the sugar mill, it has become a great desideratum to reduce the size or diameter of the pinion of the gear, as respects the diameter of the wheel; and, as the strain is great, this can be done with safety, by inside gearing, to a far greater extent than with the ordinary gearing, while, from the greater number of teeth "in hold," a smoother action takes place.

The patentee claims, First,—the combination of a steam-engine and connecting gear (for driving a sugar mill) upon a base-plate or foundation-plate common to both, and adapted to be united to the base-plate of an ordinary sugar mill,—the fly-wheel and the gear being all above the base or foundation-plate; also, the applying inside gearing between the steam-engine and the sugar mill, as described.

And, Secondly,—the connection or coupling shewn and described in combination with a sugar mill, and the driving gearing thereof.

To Robert Wyburn, *of East-street, Taunton, for improvements in the construction of easy chairs.*—[Sealed 14th April, 1853.]

This invention relates to a novel construction of easy chair, made of wood, with moveable cushions, and a reading desk, which also forms an invalid or other table. The seat of the chair consists of a frame, crossed with wooden strips, the side rails of which are cut crooked, and continued to form back legs. To this frame strong arms are fastened. The back of the chair is a separate piece of framework, attached to the seat by means of a thumb-screw on each side: to this are fastened two ends of two leather straps, the other ends of which, having several holes, pass over the arms under a stuffed pad, and fasten to a hook; by which means the back may be placed in a perpendicular or horizontal position; thus forming a reclining chair, when necessary. Underneath the seat is another frame, which hinges to the front rail of the same, and may be turned out—thus extending the length of the chair; this being supported by two folding legs, and forming, in connection with the seat, a double incline plane, particularly adapted, with the back, to give ease to the human body. When this frame is not required, it fastens back under the seat. The front legs, being cut crooked, spread wider at the bottom than the top, where they are attached by a strong hinge to the bottom side of seat. The chair, when not in use, may be folded entirely up.

The reading desk may be attached instantly, and is formed by an arm or cross-piece, through one end of which passes a wooden screw, fixing into the end of a turned upright, which is fastened by two pins to the arm of the chair, having a flap at the other end of the cross-piece, which may be used flat as a table, or turned up as a desk; the height also may be regulated at pleasure, and any horizontal position obtained. The cushions fasten to the chair by means of straps going over brass buttons for that purpose.

In Plate IV., is a side view of a chair, constructed according to this invention. *a*, is the seat, at the back of which the frame is formed, with the two hinder legs a^1, a^1. The front legs a^2, a^2, are hinged to the front of the frame a^1, *a*; and at the front of the frame *a, a*, is also hinged the leg-rest *b, b*, as is shewn, *c, c*, is the back of the chair, which moves on axes or thumb-screws *d, d*, which pass through the hinder parts of the seat *a*, and through the lower part of the back; *e, e*, are straps, fastened to the back; and, passing over the arms *f, f*, are made fast to buttons *g, g*, at the front: and,

in order that the position and inclination of the back may be varied, there are several holes in the front end of each of the straps. The arms *f, f,* are fixed to the frame or side rails of the seat *a, a.* The stuffing *h, h,* of the chair is made separate, and is fixed by straps. *i,* is a reading or other table, its stem being fixed to the arm by buttons, which enter slotted openings in a plate fixed to the side of one of the arms. In place of the foot-rest being hinged to the front of the chair, the same may be made to slide in grooves or guides under the seat, and have an India-rubber spring tending to draw it back when released by a suitable catch.

The patentee claims the combination herein shewn and described.

To RICHARD ARCHIBALD BROOMAN, *of Fleet-street, for improvements in inhaling tubes.—being a communication.*—[Sealed 20th April, 1853.]

THIS invention has relation to the construction of inhaling tubes, for expanding the chest and exercising the lungs by means of respiration. The theory on which the operation of these instruments is based is well known. It has been found to increase the beneficial effect, to exhale the breath under more pressure than is exerted in the act of inhaling it.

The figure, in Plate IV., represents an inhaling tube; in which *a,* is a short tube of silver, or other non-corrosive metal, which forms the mouth-piece. At the end of this is a valve-chamber, consisting of a short cylinder, open at both ends. One end forms a seat for a poppet-valve *c,* the guide stem of which plays within a socket in a cap *d,* which is attached at the opposite end of the said cylinder; the cap being fitted like a stopper, so as to be readily taken out and replaced. Within this cap is a small orifice *e;* and it is through this that the breath is forced by exhaling. By enlarging or contracting this orifice, various degrees of pressure may be produced; and for that purpose several caps may belong to one instrument, each having at *e,* a different sized orifice; so that this part may be very conveniently regulated.

The operation of the instrument is as follows:—On placing the tube *a,* in the mouth, and drawing the breath, the valve *c,* is lifted from its seat, and the air is permitted to pass through, but with a certain degree of obstruction, so that some exertion is required to overcome it. On fully inflating the lungs, the process of exhaling commences: this causes the valve *c,* to drop into its seat again. The air must then pass out by *e,*

which increases the pressure, and therefore produces a greater degree of mechanical action on the muscles and membranes of the chest and lungs; thereby forcing the air into the most remote recesses of the lungs, and producing the curative effects peculiar to this class of instruments.

The patentee claims the construction of inhaling tubes, in such manner that the breath of the user shall be exhaled under greater pressure than is exerted in the act of inhaling, as hereinbefore described.

To JAMES PETRIE, *of Rochdale, for certain improvements in steam-engines.*—[Sealed 21st April, 1853.]

THESE improvements in steam-engines apply principally to condensing steam-engines, and relate to a peculiar arrangement of apparatus to be applied to the same for the purpose of heating the water previously to its being fed into the steam-boiler by the ordinary force-pump. The water is heated by the exhaust steam during its passage from the exhaust side of the valves to the condenser. The exhaust pipe which connects the side pipes of the steam-engine with the condenser is inclined or curved; and to the lower side of this inclined or curved part of the pipe a vertical tube or "pocket" is connected, from the lower part of which tube or pocket a tube communicates with the ordinary force-pump. The patentee remarks, that it is desirable that the diameter of the said pipe should be about equal to that of the "ram" of the force-pump; and that the pump be placed as low as convenient, in order that the water may feed the pump by its own gravity; otherwise the vacuum in the condenser would have a counteracting tendency. The water is admitted from the hot well by means of a pipe dipping therein, the upper extremity of which communicates with about the lowest part of the side pipes on the opposite side to the exhaust pipe. The pipe leading from the hot well is furnished with a stop-cock, in order to allow of a supply of water being regulated according to the quantity necessary to feed the force-pump.

Immediately above the opening of the tube leading from the hot well is fixed a disc, which acts as a breakwater, and prevents the water from rushing in a column up the side pipe, as soon as the stop-cock is opened.

Upon the opening of the stop-cock, the water from the hot well is drawn into the pipes by means of the vacuum therein, and, mingling with the exhaust steam on its passage through the side pipes to the condenser, becomes thereby raised to a

high temperature. As soon as the steam and water, thus mingled, arrive at that point of the curved or inclined part of the exhaust pipe leading to the condenser, where the vertical pipe or pocket joins to it, the water, owing to its superior gravity, being at the lower side of the inclined or curved part of the pipe, separates from the steam, and flows into the vertical tube or pocket, and thence to the force-pump, whence it is pumped or fed into the boiler in the ordinary manner, whilst the steam proceeds as usual to the condenser. Thus, it will be evident, that a constant circulation of water through the exhaust pipe takes place, by which means it becomes heated; and the boiler being thus supplied with water at a high temperature, a great economy of fuel is thereby effected.

In Plate III., the figure represents a vertical section of the side pipes and valve casings of an ordinary steam-engine. *a, a,* is the feed or steam-pipe from the boiler; and *b, b,-c, c,* are the side pipes; *b, b,* being the pipe for the ingress of steam, and *c, c,* the pipe for the egress of the steam. *d, d,* are the valve casings; and *e, e,* are the piston-valves. *f, f,* is the exhaust pipe leading to the condenser. It will be observed, that this pipe *f, f,* is inclined or curved towards the left hand; and that to the lower side of the inclined or curved part a vertical tube or pocket *g, g,* is connected. *h, h,* is a pipe leading from the tube or pocket *g, g,* to the force-pump. *i, i,* is the pipe leading from the hot well, which is furnished with a stop-cock *k, k.* The lower extremity of the pipe *i, i,* dips into the water in the hot well; the end thereof being "plugged" and drilled with a number of small holes. *l, l,* is a disc supported upon rods *m, m,* and is for the purpose of distributing the water, and preventing it from rushing in a column up the exhaust side pipe *c, c.* As soon as the stop-cock *k, k,* is opened, the water is drawn into the side pipes by the vacuum therein, and being broken (as it were) by the disc *l, l,* passes off with the exhaust steam towards the condenser, and being at the lower part of the curved or inclined pipe *f, f,* becomes caught in the tube or pocket *g, g,* and flows thence down the pipe *h, h,* to the force-pump.

The patentee claims the arrangement of apparatus above described and shewn in the drawing, for heating the water previously to its being fed or pumped into the boiler; more especially the vertical tube or pocket, to arrest the water, and separate it from the steam, without the necessity of any breakwater or other impediment in the exhaust pipe leading to the condenser.

To Ezra Miles, *of Soulbury, Bucks, for improvements in railway brakes.*—[Sealed 21st February, 1853.]

This invention consists in the application of hydrostatic pressure to the brakes of railway carriages, whereby the brakes of every carriage throughout a train can be brought into immediate action. This object is accomplished by fixing beneath each of the carriages, trucks, or waggons, a metal tube or tubes in connection with a cylinder, which is screwed to the framing of the carriage in any convenient manner. These tubes are furnished with suitable joints, as hereinafter described; so that when a number of carriages, trucks, or waggons are linked together, the tube or pipe forms an uninterrupted communication from one end to the other. The tender to the locomotive has also a similar tube to the foregoing, which communicates with the water in the tank, and is continued beyond this, and finally enters the boiler of the locomotive. Also from this tube is one carried on to the front of the engine, which is closed by a tap. The whole is so arranged that the tubes and cylinders beneath the carriages are filled with water from the tank of the tender. The piston of each cylinder is connected by a lever to others which work the brakes. When it is required to put on the brakes, it is done by simply turning a cock or tap, so as to allow a small portion of water to issue from the engine boiler. The pressure of the water in the boiler acting upon the water in the tube, instantly causes the pistons of the cylinders to rise, and forces the brakes against the wheels. By this means, a force equivalent to, say, ten thousand pounds, may be brought to bear upon each carriage.

In Plate III., fig. 1, is an elevation of the lower part of a railway carriage, shewing the application of this invention thereto; fig. 2, is a partial elevation of a locomotive and tender; fig. 3, is a vertical section of one of the cylinders; and fig. 4, shews the mode of connecting the tubes together.

a, a, fig. 1, is the framing of the carriage; *b, b,* the brakes; *c, c,* the rods connecting the brakes with the levers *d, d*; *e,* is a metal tube or pipe, of about one inch diameter, secured to the framing of the carriage in any convenient manner, and running along its centre. Opposite the cylinder *f,* the pipe branches off, and is screwed into one side of the cylinder, as shewn at f^1. Another pipe is carried from the opposite side of the cylinder, as at f^{11}, to the end of the carriage. *g,* is a short rod, forming a continuation of the piston. This is connected by a joint to the lever *h.* When the piston is forced

up by pressure on the water, it draws with it the lever *h*, which, acting on the rods *c, c,* forces the brakes upon the peripheries of the wheels. The rod *g*, has a joint g^1, in it, to give freedom to the lever *h*, in its ascent and descent, and maintain the rod *g*, perpendicular.

The arrangement of the tube beneath the tender is similar to the foregoing, excepting that it must be carried from the centre, at the end next the train, and thence diverge a little at the other end, in order to avoid the draw-bars, &c., and be opposite the short length of tube proceeding from the boiler of the locomotive. *e*, is the tube communicating with the water in the tender or tank, by means of a pipe *k*, bent into a syphon shape, and having a valve fitted in it, so as to allow the water from the tank to fill the tubes throughout the train, but prevent its return when the pressure of the water in the boiler is applied, as shewn at fig. 2. The handle or rod *l*, turns a cock, which prevents the water running away when the tender is disconnected from the carriages. Another cock *m*, is to allow the surplus water to return to the tank, when it is desired to take the pressure of the brakes off the wheels. *n*, is a cylinder fitted to the framing, similar to that marked *f*, fig. 1. A lever or levers, *o*, are jointed to the brake-rods in the manner shewn, or by other suitable means. The tube *e*, is continued beneath the locomotive, and into the boiler. A cock, turned by the handle *p*, shuts off the water of the boiler from entering the tube, except when required; and it is placed so as to be within immediate reach of the engineer or stoker. Supposing it be necessary to stop the train, by simply turning the handle *p*, a pressure equivalent to that within the boiler is instantly brought upon the brakes. The water throughout the tubes and cylinders, now forming part of that in the boiler, is subjected to the same degree of compression. The valve in the pipe *k*, preventing the return of any water into the tank, the pressure may be retained any length of time, and wholly independent of any attention beyond that required for the locomotive. Upon shutting the cock *p*, and opening *m*, the surplus water flows into the tank. The weight of the pistons in the cylinders forcing it back, and in their descent acting upon the levers, the pressure of the brakes is removed from the wheels; so that the application and removal of the pressure is under perfect control. It is preferred that every carriage, truck, or waggon in a train should be furnished with brakes, and the apparatus for acting as herein described; although now only two or three carriages in a train may have the brakes on them,—each carriage requiring an attendant to work them.

Fig. 3, represents a vertical section of the cylinder *f*, fig. 1. One of these is secured to the framing of each carriage, truck, or waggon, in any part most suitable for the lever of the brake. It consists of a metal cylinder *q*, having a solid piston or ram *r*, travelling within it, the weight of which forces back the water when the cock *m*, is opened.

Fig. 4, is a plan of the apparatus proposed to be used for connecting the carriages together, so as to allow for the contraction of the buffer-springs, and lateral curvature of the train in passing curves, &c. *s*, is a ball-and-socket joint, forming a continuation of the tube *e*, fig. 1. Beyond this is the tube *t*, having at its end a stuffing-box t^1, in which the tube *u*, slides to and fro, a distance equal to the traverse of the buffer-bar. The central link *w*, has a stuffing-box w^1, at each end, and a water-way through it. The end of the tubes *u*, are passed into the ends of the link *w*, and the chain *x*, hooked into the eye x^1,—the opposite chain x^{11}, being hooked in the reverse way to the eye x^{111}. The ball-and-socket joints *s*, allow for the varying curves of the train, and the sliding of the tubes *u*, within the tubes *t*, for the shortening of the train, by the carriages striking against each other when the train is stopped, or the speed slackened: at the same time an uninterrupted passage is preserved for the circulation of the water. The patentee remarks that in some cases it may be desirable to maintain a circulation of hot water throughout the tubes, for the purpose of warming the carriage; but it is sufficient for the purpose of putting on the brakes, if the tube enters at one side, without having an outlet: in some instances, however, it may be desirable to provide against the effects of frost on the water, for which purpose some slight modifications may be needful. The far end of the tube must, of course, be closed by suitable means.

The patentee claims the application of hydrostatic pressure to the working of brakes of railway carriages, for the purpose of stopping or retarding trains in the manner hereinbefore described and shewn.

To John Powis *and* Jabus Stanley James, *both of Watling-street, wholesale ironmongers, for improvements in machinery for slotting, tenoning, morticing, grooving, drilling, boring, and vertical planing.*—[Sealed 10th March, 1853.]

This invention consists in inserting the requisite tool for either slotting, tenoning, morticing, grooving, drilling, boring,

or vertical planing, in a stock or spindle which has a vertical motion given to it by means of a crank or lever, actuated by suitable gearing from a shaft driven by either a belt from a steam-engine or other prime mover, or by hand. The wood or other material to be operated upon is fixed in a position immediately beneath the tool, between two jaws, which move on the bed-plate of the machine, in a manner similar to the slide-rest of a lathe.

In Plate III., fig. 1, is a side elevation, fig. 2, a front view, and fig. 3, a back elevation of a machine constructed according to this invention. A, A, is the framework, which also forms the base for the upper parts of the machine to rest upon. The top surface of this framework is planed perfectly true, and has formed upon it the V-pieces *a, a,* in which the slide B, is capable of being moved to and fro in a longitudinal direction, when acted upon by the hand-wheel C, keyed upon the spindle D, which also carries a pinion E, (shewn in dotted lines in fig. 3,) in gear with a rack bolted to the under side of the slide B. By this means the exact longitudinal position of the slide can be regulated, so as to bring the wood, or other material to be operated upon, immediately beneath the action of the cutter. F, is another slide, which works transversely in V-grooves *b, b,* upon the slide B, and is adjusted to the cutter by the hand-wheel G. H, H^1, are two jaws, between which the material to be operated upon is held. The jaw H, is cast in a piece with the slide F, while the jaw H^1, is free to slide backwards and forwards, and is adjusted to the requisite gauge by the screw I, tapped through a nut in the bracket K, and turned by the hand-wheel L. M, is an upright frame, the lower portion of which slides in V-grooves *c, c,* on the framework A, but is retained, in its proper position, by the screw and nut *d,* passed through the slot *e, e.* By means of this slot *e,* the height of the frame M, can be regulated to adapt it to the stroke of the cutter. N, is a vertical shaft, which slides up and down in the bearings O, O^1, upon the frame M. The lower end of this shaft is formed with a socket, in which the requisite tool is inserted, and then held firm in its place by the screw *i.* The upper part of the shaft is capped with the T-piece P, from which are pendent the two rods Q, Q. R, is a counterbalance-lever, centred upon the frame M, at *g,* and connected to the lower ends of the rods Q, Q. S, is a bevil-pinion, cast in a piece with a hollow tube *h,* through which the shaft N, passes. This tube *h,* is held in the bearing O^1, and is provided with holes, into which the end of the pin *f,* takes, so as to hold the cutting-tool firm, and

also to enable the tool to be reversed. The bevil-wheel S, is connected to the shaft by means of a feather and groove. T, is a second bevil-wheel, upon the shaft *l*, supported and turning in the bracket U, bolted to the frame M. W, is a crank-handle for imparting motion to the bevil-wheels S, and T, and through them to the shaft N, when the machine is to be used for drilling or boring,—a tool proper for such purposes being then inserted into the socket in the end of the shaft. X, is a spur-wheel upon the spindle D; and Y, is a pawl, which takes into the teeth of the spur-wheel D. This pawl is centred upon a pin in the end of a bell-crank lever Z, which is centred at *m*, in the bracket *n*, upon the framework A. *o*, is a lug, projecting from the lever Z; and *p*, a rod, pendent from the lever R, and passed through a hole in the centre of the lug *o*. *r*, is a stop or ferrule upon the rod *p*, and is capable of being retained in any required position on the rod by the screw *s*. The object of this arrangement is to give to the slide B, and the material to be operated upon, their proper and regular feed beneath the cutter. *t*, is a band of vulcanized India-rubber, which embraces the bracket *n*, and bell-crank lever, and so acts as a spring to draw back the pawl when the lever R, is raised.

The action of this machine is as follows:—Supposing the machine to be used for either morticing, grooving, or slotting, a tool, similar to that shewn at figs. 4, and 5, is inserted into the socket in the end of the shaft The wood, or other material to be operated upon, is then placed between the jaws H, H^1, and its position, beneath the cutting-tool, is determined by means of the hand-wheels C, and G. The cutter is then set to work by depressing the lever R, which brings the cutter into contact with the wood. The lever R, is then raised, which causes the rod *p*, to be depressed, and the spur-wheel X, (through the medium of the stop *r*, bell-crank lever Z, and pawl Y,) to make a partial revolution; while the pinion E, gearing into the rack upon the under side of the slide B, causes that slide to be moved forward the requisite amount of feed, so as to advance the wood for a fresh cut. The amount of feed can be regulated by shifting the stop *r*, either up or down the rod *p*. When it is desired to reverse the cutter, the pin *f*, is withdrawn, the shaft turned, and the pin again inserted into the opposite hole; at the same time the pawl is reversed, so as to act upon the opposite side of the spur-wheel, whereby the slide B, is caused to traverse in the opposite direction. For tenoning, the same mode of operation is observed,—the tool represented in fig. 6, being employed in-

stead of the one shewn in figs. 1, 2, and 4. For vertical planing, a tool suitable for such purposes is inserted into the socket, and operated in the manner before described. When it is desired to apply the machine to drilling or boring, it will be necessary to employ a tool similar to the one represented in fig. 7; and also to give to the spindle or shaft, carrying such a tool, a rotary motion by means of the bevil-wheels S, and T, and crank-handle W.

The patentees claim the several arrangements and combinations of machinery and apparatus for slotting, tenoning, morticing, grooving, drilling, boring, and vertical planing, constructed and working in the manner hereinbefore described and represented in the drawings.

To THORNTON JOHN HERAPATH, *of Bristol, analytical chemist, for improvements in treating sewage, and in manufacturing manure therefrom.*—[Sealed 15th March, 1853.]

THIS invention of improvements in the treating of sewage consists in causing the phosphoric acid and ammonia of such matters to be precipitated in a comparatively insoluble state, by the addition of magnesia, or a magnesian compound, at or about the same time that the deodorization of the sewage is effected by the addition of some deodorizing chemical agent, which will not decompose ammonia or its salts.

In carrying out this invention, the patentee runs the matters into a tank or reservoir, and adds to them chloride of magnesium, nitrate, or sulphate of magnesia, or burnt and slacked magnesian limestone, commonly called dolomite, or a mixture of carbonate of magnesia and carbonate of lime, which will slack together. He adds, either before, after, or about the same time, such deodorizing agent as may be added without decomposing ammonia or its salts, but will combine with or absorb hydro-sulphuric acid, such as metallic sulphates, or metallic chlorides, or animal or vegetable carbon. Upon such additions, the sewage matters lose their offensive smell, and their fertilizing parts precipitate to the bottom. The supernatant clear fluid is allowed to flow off, and either to irrigate the adjacent land, or to run to waste. The pulpy sedimentary matters are now dried, either by the admixture of some material capable of absorbing water (such as sawdust, malt combings, ground bones, or coprolites, and so forth), or they are dried by artificial heat of moderate degree; when these matters form a manure of great fertilizing power, for use, either by themselves or by admixture with other suitable manures.

The patentee claims, the combined employment of magnesia and its compounds, together with deodorants, to sewage matters, so as to precipitate their useful parts, deodorize them, render them readily portable, and manufacture them into manure, in the manner hereinbefore described.

To Robert Evans Peterson, *of Tottenham-court-road, Gent., for an improved piston,—being a communication.*— [Sealed 1st April, 1853.]

This invention consists in forming a piston for steam, hydraulic, pneumatic, or other engines, of a flexible or elastic material, of a hollow, hemispherical, or conical shape, provided with a rim or flange around its outward edge, which flange is held fast, by screw-bolts, between the flanges of two hollow metal hemispherical-shaped vessels, which form the cylinder; and within the upper cylinder, the flexible piston is enclosed, so as to form a steam-tight chamber between its upper surface and the inner surface of the metal hemisphere. The flexible hemispherical or other shaped piston is constructed of any suitable non-conducting substance, as vulcanized India-rubber, or canvas united to vulcanized India-rubber. The piston-rod works through a stuffing-box attached to the top of the upper metal hemisphere, and is also passed through the upper part of the flexible hemispherical piston, to which it is securely fastened by means of two wooden washers, which are made to press and bind against the upper and under surface of the top of the flexible piston, by the screw and nut at the bottom of the piston-rod acting against them.

When this invention is used as part of an hydraulic engine, it is evident, by the admission of steam into the chamber between the flexible piston and the upper metal hemisphere, that the piston will become inverted and have a downward direction,—displacing the body of water in the cylinder beneath the lower surface of the piston. For the upward stroke of the piston, it is only necessary to produce a vacuum in the steam-chamber by the ordinary means, when the piston will return to its original position.

The results derived from the use of the flexible non-conducting piston are, that it requires no packing, and can be kept perfectly steam-tight, whilst it prevents the condensation of steam in the steam-chamber when the cold water is admitted into that portion of the cylinder beneath the piston.

In the figure, in Plate IV., *a, a,* represents a vertical section of a metal cylindrical vessel, formed in two hemispheres,

having an outward flange on the bottom of the upper hemisphere, and also one on the upper edge of the lower. Between these the flexible hemispherical non-conducting piston *b*, is fixed, within the upper cylinder, by means of its projecting rim or flange, which is securely held between the flanges of the two metal hemispheres by screw-bolts and nuts,—thus forming a steam-tight chamber between the upper surface of the piston and the inner surface of the upper hemisphere. *c*, is an ordinary stuffing-box; *d*, the piston rod; *e*, *e*, are two wooden washers, made to press and bind against the upper and under surface of the top of the piston, by the screw and nut on the end of the piston rod; *f*, *f*, the flanges on the metal hemispheres, for holding securely between them the flange of the non-conducting piston, by means of the screw-bolts *g*, *g*. The dotted lines represent the position of the piston when it has become inverted, after its downward stroke. *i*, is a water supply-pipe; *j*, an outlet-pipe; *k*, *k*, are valves in the supply and outlet-pipes; and *l*, is a pipe for supplying steam to the steam-chamber.

The patentee claims the application of a non-conducting material for the formation of a flexible piston for steam, hydraulic, pneumatic, or other engines, as herein set forth and described.

To Joseph Rock Cooper, *of Birmingham, gun-maker, for improvements in fire-arms.*—[Sealed 19th January, 1853.]

This invention is applicable to breech-loading fire-arms, and consists in constructing the breech in the following manner:—Part of the breech is made moveable, near its back end, and it moves on a horizontal axis, so that its fore end may assume an angular position to receive the charge. The moveable breech is caused to assume the angular position by means of a lever, having its axis of motion at one side of the fire-arm, which lever, by a projection, acts on an incline at the side of the moveable breech, and the moveable breech is returned to its firing position by the bringing back of the lever, which comes between the moveable and the solid parts of the barrel. The side of the lever is slightly inclined, and forces the moveable breech up to the barrel. The lever has a tendency to remain in either of its two positions (till it is forcibly acted on) by reason of a retaining spring. Or the side of the lever may be bored out, and itself become the moveable breech of the fire-arm.

In Plate IV., fig. 1, is a longitudinal section of the back

end of a barrel constructed and arranged suitably for carrying out this invention; fig. 2, shews a section of the barrel taken in the dotted line of fig 1; fig. 3, shews a longitudinal section of part of the barrel, with the breech fastened in the position for firing; fig. 4, shews the breech raised into an angular position for loading; fig. 5, shews the breech in the position after loading, and before the lever has forced it up to the barrel; and fig. 6, shews an end view of the barrel and breech on which the lever for fastening the breech, when in a firing position, is applied. *a*, is the barrel, and a^1, the solid part at the back end, between which and the back end of the moveable breech the lever comes, in order to fasten the breech, and to force it up to the position for firing. *b*, is a spring, which acts on the projecting part of the breech, as shewn; and this spring gives the breech and the lever a tendency to remain in either of the two positions in which the lever may be placed. *c*, is the moveable breech, having an under projection c^1, with a slot in it, by which means it can not only be slidden to and from the barrel, but also be moved on the pin *d*, as an axis; there being a slot formed in the barrel *a*, at a^2, for receiving the projection c^1, of the breech *c*, as shewn. *e*, is the lever, which moves on an axle e^1, supported in projections on the side of the barrel. A projection e^2, on this lever, passes through an opening in the barrel, and enters a groove formed in the side of the breech; by means of which, when the lever *e*, is moved over, the breech will be raised into an inclined position to admit of its being loaded; and the moving of the lever *e*, across the barrel, will first cause the breech to assume the position shewn at fig. 5, and will then by its inclined side force the breech up to the barrel, and cause it to assume the position shewn at fig. 3.

In figs. 7, and 8, a modification of this invention is shewn. It consists in having the lever so formed that the breech is made by boring into the side: at the same time the lever is capable of such movement as to admit of the breech being forced up to the barrel, and of being held securely when firing. *f*, is the lever, which consists of two parts *f*, and f^1: the part *f*, is bored out to form the hollow breech of the fire-arm, of which *a*, is part of the barrel. a^1, is the solid end thereof, there being an opening in the upper part of the barrel to receive the lever-breech *f*, as is shewn. The lever-breech turns on an axis f^2, carried by projections at one side of the barrel, which allows of an endway movement to the breech to allow of its moving to and from the barrel *a*. The part f^1, of the breech turns on an axis f^3, at the back end of the breech, and

the part f^1, where it embraces the axis f^3, is made excentric; by which means, when the lever-breech *f*, has been loaded and moved into position behind the barrel *a*, the folding down of the part f^1, will cause the lever-breech *f*, to be forced up to and retained in position for firing.

The patentee claims, First,—the mode of combining the parts described with reference to figs. 1, to 7, inclusive; and, Secondly,—the mode of combining the parts called the lever-breech, as herein described.

To William James Harvey, *of Exeter, gun-maker, for improvements in fire-arms.*—[Sealed 26th May, 1853.]

This invention relates to a novel construction of rotating breech fire-arms.

In Plate III., fig. 1, shews a longitudinal section of a pistol constructed according to this invention. Fig. 2, shews two views of the barrel separately, and the shield in front of the short barrels, which contain the charges. Fig. 3, shews a back end view of the short barrels which receive the charges, and which revolve on an axis, in order, in succession, to come opposite the end of the stationary barrel. *a, a*, are the short barrels which receive the charges. These barrels *a*, are carried by the fixed axis *b*, and are capable of revolving thereon; and the barrel *c*, through which the charges are all fired, is keyed on to the axis *b*, by a key *d*; the axis itself being fixed to the stock or handle by means of the plate *e*, which has flanges e^1, forming a cylindrical guard to the nipples, and to the detonating caps placed thereon. The centre of the plate *e*, is made to receive the ratchet *f*, formed at the back of the barrels *a*; and through the plate *e*, is a slot, in which the end of a lever *h*, works, and by which the barrels *a*, are turned partly round, so as to bring up another barrel *a*, correctly, to fire through the barrel *c*, by the end of the lever *h*, acting on one of the teeth of the ratchet. In order to prevent the barrels *a*, from being moved too far, a sliding bolt *i*, moves through a hole in the plate *e*, and locks the barrels in position. *j*, is the trigger constantly pressed on by the spring *k*, with a tendency to bring it back. *l*, is a driver attached to the upper end of the trigger, such driver being constantly pressed outwards by the spring *m*. When the trigger is pulled, the driver *l*, acts on the lever *n*, which is in connection with the main spring *o*, by means of the link *p*. At the upper end of the lever *n*, is attached the hammer or ram *q*, which gives

the necessary blow to the cap on a nipple. The sliding-bolt *i*, and the lever *h*, are connected to the upper end of the trigger.

The patentee claims the combination of parts herein described.

To William Johnson, *of Lincoln's-inn-fields, civil engineer, for improvements in rolling and shaping malleable metals,—being a communication.*—[Sealed 22nd March, 1853.]

This invention relates to a novel system of rolling or shaping various malleable metals, and bears more especially upon the manufacture of wrought-iron into railway wheels and wheel-tyres, railway bars, cylinder and valve-covers, boiler-ends or heads, as well as flat plates, discs, and cones.

In forming solid railway wheels, by this system, a revolving horizontal table, carried by conical bearing-rollers, is used; which table has a central recess in it, to receive the lower shaping-die for one side of the wheel to be rolled. This die-surface corresponds, in the sectional outline, with the outline of one side or face of the wheel, and it has a central pin standing up to form the axle-hole in the wheel-boss. It is upon this die that the mass of metal to be rolled is laid,—such mass being squeezed on the upper surface, to form the opposite and sectional outline of the wheel, by a pair of horizontal rollers set with their axles in one line, but revolving in opposite directions. These rollers are driven from their outside ends furthest from the centre of the apparatus,—their inner ends being brought closer together at a point coinciding with the centre of motion of the revolving wheel and die apparatus. Thus, to accomplish the required shaping effect, the two rollers of this pair are exact counterparts of each other, and are each shaped so that their longitudinal sections coincide with the sectional contour of the radius of the wheel. In this way, when the apparatus is set in motion, with a mass of iron laid in it, the combined effect of rollers and die shapes the two sides or faces of the wheel; whilst the tyre or running surface is formed by the circumferential pressure of two or more vertical rollers shaped to the required tyre section. In this way a finished wheel is rolled at one operation, by the combined roller and die-actions.

By another modification the circumferential shaping-rollers are dispensed with, and the rolling surface of the wheel is shaped by forcing the malleable metal into an annular recess surrounding the table carrying the bottom revolving die. Or no table need be used, if three or more horizontal rollers

are suitably disposed above and below the metal to be rolled, such rollers being set to radiate from the wheel's centre,—the tyre surface being formed with circumferential rollers as before. It is to be understood that all kinds of malleable metal may be shaped or manufactured by this system,—the dies or rollers being suitably modified for their special purposes. Copper still-bottoms, buffer-plates, and tubes, may be thus made.

In Plate IV., fig. 1, is a vertical section of one modification of the invention; fig. 2, is a vertical section of a slightly different modification; and figs. 3, and 4, are a vertical section and a plan of a third. In these several modifications a railway wheel has been selected as the article operated upon in illustration of the invention: such a wheel is represented at *a*, fig. 1, in the act of being formed. Its under side is shaped by the die-plate *b*, fixed upon a vertical spindle, and fitting into a recess in the table *c*, which revolves upon the conical rollers *d*. Die-plates, of various patterns, can be fitted into the table *c*, according to the section it is desired to give the wheel. The axle-hole, in the wheel-boss, is formed by the pin *f*, standing up in the centre of, and made in one piece with, the die-plate *b*. The upper side of the wheel is shaped by the two horizontal rollers *e*, of a contour corresponding to the section to be given to that side of the wheel. The axles of these rollers are in the same straight line, but they are made to rotate in opposite directions, by gearing at the outer extremities of their spindles. They are borne in a suitable frame, to allow of their being removed for the introduction of the metal to be shaped. In this instance the tyre of the wheel is formed by the vertical rollers *g*. Four of these vertical rollers are represented as acting upon the periphery of the wheel; but more or fewer may be employed, as may be found advantageous.

According to the modification represented in fig. 2, the vertical rollers, for shaping the tyre of the wheel, are dispensed with,—the proper form being given to this part by the table *c*, the outer edge of which rises above the die-plate *b*, and is moulded to the required contour as at *h*: the rollers *e*, *e*, have shoulders *i*, *i*, so as to meet the table *c*, at the extreme outer edge of the flange of the wheel.

In a third modification of the invention, represented at figs. 3, and 4, the upper and under surfaces of the wheel are both formed by rollers. *a*, is the wheel in the act of being formed, on the upper side, by three rollers *b*, *b*, *b*, and on the under side by three similar rollers *c*, directly opposite to those

above, whilst the tyre and outside of the flange are produced by the three vertical rollers *d*. In this instance the rollers *b*, and *c*, are made slightly conical, in order to reduce the friction arising from the unequal rate of movement of the various parts of the disc of the wheel. It is also obvious, that conical instead of cylindrical rollers may be employed, to shape the upper side of the wheel, in the modifications before described with reference to figs. 1, and 2.

The patentee remarks, that the number of rollers employed, under any of the modifications described, is not restricted to that shewn in the drawings, but may be increased or otherwise, as may seem desirable. In making wheel-tyres, cylinder and valve-covers, and other articles of similar shape, it will be obvious to the practical man that the form and proportions of the rollers and die-plates must be modified to suit each particular case, so as to produce the complete article at a single operation. This invention is also applicable to the construction of articles of rectilinear form, such as rails or angle iron. In this case the rail, for example, is first formed as a ring, by means of machinery similar to that hereinbefore described; after which it is cut open at one side, and then straightened by passing through rollers or otherwise.

The patentee claims, First,—the general arrangement and construction of machinery herein described, for shaping malleable metals into articles of circular contour. Secondly,—the application and use, in machinery for shaping metals, of a revolving die below in combination with rollers above, radiating from the centre, so as to produce articles of circular contour, as hereinbefore described. Thirdly,—the application and use of rollers, of various contours, arranged to act on both sides of the article to be shaped,—such rollers radiating from the centre, so as to give a circular form, as hereinbefore described. Fourthly,—the application and use of the vertical rollers for forming the tyre of the wheel, or the outside of similar circular articles, in combination with the die below and radiating rollers above, or with the radiating rollers on both sides, as hereinbefore described. And, Fifthly,—the system or mode of first shaping certain articles in an annular form, by means of the machinery herein described, and then cutting them open and straightening them out to their proper rectilinear contour.

To Samuel Bayliss, *of Old Broad-street, for improvements in consuming or preventing smoke, and heating liquids.*— [Sealed 16th April, 1853.]

The objects sought to be attained by this invention are, first, perfect combustion of the gases arising from the heated fuel in steam-engine and other furnaces, for the purpose of preventing smoke and economizing coal; secondly, to retain within such furnaces much of the heat which now passes away to the chimney, without producing any useful effect; and, thirdly, to facilitate evaporation by causing a rapid circulation in the liquids to be heated.

In order to effect a chemical combination between the gases of combustion and the oxygen of the air, the patentee proposes to intercept or retard the gases on their way from the fireplace to the chimney, by dividing them into a number of small streams or bodies, and forcing them into mechanical mixture with the air, which rises in small currents.

In Plate IV., fig. 1, is a sectional elevation, and fig. 2, is a tranverse vertical section of a furnace arranged for carrying out this invention. In place of the ordinary fire-bridge an air-chamber D, is employed, formed by two cast-iron plates E, F, built in or otherwise fixed to the walls or sides of the furnace. G, is a door, hung on a plate E, for regulating the admission of air to the chamber D, and actuated by the rod H. The upper part of the plate E, serves as a support for the fire-bars on one side, and the bearing bars *a*, on the other. The upper part of the plate F, consists of an iron dead plate, extending across the furnace, intended to prevent the air from the chamber D, reaching the flues, without first of all being incorporated with the gases. *a*, *a*, *a*, *a*, are bearing bars, laid lengthwise from side to side of the air-chamber, and secured in their places by being simply dropped in slots prepared for them. *b*, *b*, are a series of what are termed, by the patentee, "admixers and heat-retainers," which consist of rows of solid bars, of any convenient form, in metal or clay, or any suitable fire-resisting substance, having spaces *d*, between them, of sufficient area, in the aggregate, for the passage of the products of combustion; and the rows of admixers have spaces *f*, between them, for the admission of currents of air from the chamber D, to commingle with the gases. J, is a bridge, extending across the furnace, to prevent the fuel getting amongst the admixers; and is retained in its proper position by means of projections on the under side, one at each end, which fit into holes in the top of the plate E, on which it rests. K,

is a deflector, shewn in dotted lines, and is for the purpose of throwing the flames downwards, and giving them an extended sweep under the boiler; but this may be dispensed with, not being essential to the action of the apparatus. It will be seen, by the foregoing description, that the gases cannot fail to be brought into the most intimate mechanical mixture with the air, in the endeavour to find their way through the numerous channels presented to them by such an array of bars, and the agitation consequent thereon; and as the bars become red hot, and form besides a great natural harbour for heat, a steady combustion goes on from one end of the admixers to the other. Fig. 3, represents a vertical section of another mode of constructing the rows of admixers; the difference being that the base *b*, is made with holes through it, in which the upright bars *c*, are fixed. Fig. 4, is a vertical section of a third plan, varying from the latter only in having projecting shoulders *g*, on the bars *c*, in lieu of reducing the thickness of them at their lower ends. Perforated plates of metal, or slabs of fire-clay, might be used in substitution of the admixers already described. The admixers may be placed vertically or horizontally, as is thought best. It is preferred to form the admixers of cast-iron, when the heat of the furnace is not so intense as to burn them away too rapidly, on account of the cheapness of the metal, and the facility it offers for renewing them. For furnaces of very high temperature, the plan shewn in vertical section at fig. 5, may be adopted with advantage. It is composed of two vessels of plate-iron L, M, built in the sides of the furnace, and connected together by metal pipes or tubes *h*, which serve as admixers, &c. A pipe N, communicates with the force-pump, and another pipe P, with the boiler; and thus all the water that enters the latter must pass through the tubular admixers, and, by absorbing the heat, prevent them from being burnt away. This method has the additional advantage of heating the supply water, which would prove a further source of economy in the expenditure for fuel.

The second part of this invention relates to extending the admixers and heat retainers to the end of the boiler, and again, if thought desirable, through the internal tube. These being maintained at a red heat by the passing flame and heated gases, will give off, by radiation, to the surface of the boiler a great quantity of heat, which would otherwise pass up the chimney and be wasted; they will form, in fact, a continuous fire from one end of the boiler to the other, and tend to spread the heat more uniformly throughout the furnace. For evaporating pans, such as those used in the manufacture of

salt, for example, where slow combustion, and uniform heat under the whole surface are desirable, this part of the invention will be found of great practical use.

The third part of this invention is shewn at fig. 6. R, R, is a portion of the bottom of a boiler or evaporating pan; and *m, n, o,* are hollow cones, open at top and bottom, as shewn by *n,* which is a section of one of them. They are supported on legs, and fixed just above the surface of the boiler or pan, so as to leave a free passage for the liquid underneath and through them, and should be sufficiently heavy to maintain their positions by their own gravity; or a number of them may be fixed to bars of iron, which bars may be fastened down in any convenient manner, and in this case the legs will be unnecessary. The object is to produce ascending and descending currents in the liquid to be heated, for the purpose of carrying off the globules of steam from the heating surface as fast as they are formed, which will have the effect of accelerating evaporation, and protecting the iron from being burnt. On heat being applied to the bottom of the boiler or pan, it expands the liquids in the cones, and causes upward currents, when the cooler liquid outside the cones rushes downwards to supply the place of that which is ascending, and thus ensures a rapid and continuous circulation, and a quicker diffusion of heat.

The patentee claims, First,—the intercepting the gases in their transit from the fireplace to the chimney, and dividing them into a number of small streams or bodies; and bringing these in contact with a current or currents of air, in such manner as to produce an intimate mechanical mixture of air and gases, in order to facilitate their chemical union. Secondly,—the application of admixers and heat-retainers, whether employed in conjunction with the apparatus for preventing smoke, or in furnaces of any other construction. And, Thirdly, —the application of hollow cones, open at both ends, for facilitating evaporation, and preventing the bottoms of vessels used in heating liquids from being burnt.

To HENRY WILKS, *of Rotherham, in the county of York, brass-worker, for improvements in cocks.*—[Sealed 16th April, 1853.]

THIS invention relates, first, to an improved construction of cock, whereby the efficient lubrication of the barrel and plug may be easily effected, and the grooving or setting fast of the

plug prevented. Secondly, to a system or mode of lining the interior of the barrels of cocks with some soft and easily compressible material, such as leather, gutta-percha, or lead, &c.

In Plate III., fig. 1, represents a vertical section of a self-lubricating steam cock. The inlet and outlet nozzles of the cock are shewn at *a*, *b*; and *c*, is the conical plug, which is cast hollow for the double purpose of. lightness, and to allow of the internal upward pressure of the steam within the chamber *d*, keeping the plug tight when the cock is opened. The upper and solid portion of the plug has a passage *e*, drilled vertically within it, which passage diverges at *f*, into two smaller ones *g*, *g*, opening into the barrel of the cock. A nut and washer *h*, serve to retain the plug in its proper place. To the upper or square end of the plug is screwed an oil-cup *i*, the outlet of which corresponds exactly with the vertical passage *e*, in the plug. The lower portion of the oil-cup is expanded at *j*, to form a base; which expansion serves to retain the small lever or handle *k*, on the square head of the plug. By the hereinbefore-described arrangement it will be clearly seen that the plug and barrel will be constantly lubricated so long as a supply of lubricating material is kept up in the oil-cup.

The second portion of this invention is shewn at fig. 2, which represents a vertical section of a gas-cock, the improvement in which consists in lining the interior of the barrel *a*, with leather, gutta-percha, or wood, or lead, or other compressible metallic substance. The lining which is shewn by the portions *b*, obviates the necessity and expense of grinding the plug into the barrel. It will be obvious that the inside lining or coating may be fitted to the plug, instead of in the interior of the barrel of the cock.

The patentee claims, First,—the system or mode of lubricating cocks of any kind by one or more internal passages formed within the body of the plug; such passages being in connection with a suitable reservoir of lubricating material, as hereinbefore described.

Secondly,—the system or mode of lining or coating the barrels or plugs of cocks with leather, gutta-percha, wood, or soft metal, in the manner and for the purpose hereinbefore described.

To Jacques François Dupont de Bussac, *of Upper Charlotte-street, Fitzroy-square, Gent., for an improved mode of making with iodine and its compounds, in combination with substances containing extractive principles, various elementary combinations,—being a communication.*—[Sealed 18th June, 1853.]

The new processes employed for obtaining the different productions constituting this invention, are as follow:—In a glass vessel or flask, containing iodine, a solution or watery decoction of the substances containing extractive principles is placed, and the mixture is boiled up. Instead of a decoction or an infusion, prepared beforehand, first, iodine may be put in the flask; and, secondly, water, and a portion of one of the substances containing extractive principles. By ebullition a portion of the iodine combines elementarily with the hydrogen of the water and extractive principles of the substance; and, by this elementary combination, forms a small portion of iodohydric acid. This acid, while being created, helps to dissolve a fresh portion of iodine. The iodine, just dissolved, takes, in its turn, a portion of the hydrogen contained in the water and the extractive matter, and combines elementarily with that hydrogen, to form a fresh portion of iodohydric acid. The solution of iodine, and its combinations with the hydrogenic parts of the liquid, thus renew, till there is no more iodine to be dissolved and to be transformed into iodohydric acid. As to the iodinic acid, which, during these combinations, is created at the expense of the oxygen of the water and the extractive matters, it is soon, under the influence of heat, decomposed into oxygen and iodine: the iodine, thus formed, again combines elementarily with the hydrogenic matters of the solution, and is transformed into iodohydric acid. The time of ebullition cannot be exactly determined: it must be continued till the complete transformation of the iodine into iodohydric acid, when the starch is no longer colored blue by the solution. This iodohydric acid is liquid, and free from all mixture, stable, its color is white, and similar to the color of the solution, or of the decoction which has furnished the hydrogenized elements. The color of the iodine has disappeared. It is, indeed, the spirit of iodine, which possesses all the medical qualities of iodine without having the smell, the taste, and the intoxicating properties of that metalloid. As the first idea of this transformation of iodine is due to the labors of the celebrated French Doctor Magendie, the patentee terms the substance "Magen-

die's iodohydric acid," or "Magendie's spirit of iodine." It may sometimes be necessary first to dissolve the iodine. The ordinary means of dissolving that metalloid may then be used; but the best solvent is liquid and pure iodohydric acid: the solution of iodine is then free from all extraneous matters. When iodohydric liquid acid is made by known means it is never pure; moreover, it only remains colorless a few moments, and changes nearly immediately into a reddish brown. This is caused by the oxygen decomposing the iodohydric acid into oxygen and iodine. The iodine, freed by this decomposition, is re-dissolved in acid not yet decomposed, and colors the mass, which re-assumes the smell, taste, and intoxicating action of iodine.

The iodohydric acid, obtained by known processes, is then never pure nor stable. But if, after having created the iodohydric acid by one of these processes, it be mixed with a solution of gum, or with a liquid containing extractive principles, a perfect combination of the parts of iodine with hydrogen, of the water and of the extractive matters, is effected; and this elementary combination forms a liquid iodohydric acid, perfectly stable. The ebullition, though not indispensable, hastens and perfects this elementary combination. Among the substances which, by their solutions and infusions or decoctions, simple or combined, may offer to the iodine the elements of an elementary and perfect combination, and facilitate its transformation into iodohydric acid, the following may be mentioned:—soluble gums, saccharine matters, cocoa or cocoa barks, lychens, rose leaves or hollyhock roses, angelica, dogsgrass, marsh mallow flowers, sarsaparilla, or the different sudorific woods, dates, jujubes, and all bechic fruits; the four pectoral flowers, the flowers of the elder tree, saponary, borage, fumatory, woody night shade, squina, elecampane (also other emollient and bechic kinds of plants, and the roots of liquorice and marsh mallow), gentian, scabians, violets, and heartsease, the leaves of the walnut-tree, tea, camomile, roasted acorns, the barks of the various kinds of cinchona (milk, butter-milk, caseum, fat broths, wine, beer, black coffee, vegetable oils, and even glycerine) furnish the necessary elements for the transformation of the iodine into iodohydric acid: in a word, all the vegetable and animal substances containing extractive principles may be employed for this transformation of iodine. The quantity of substances to be employed in each operation depends on the quantity of iodine to be transformed, and on the relative quantity of the extractive principles contained in these different substances.

It is not absolutely necessary to submit to the action of fire most of these mixtures with the iodine; it is sufficient to expose them to the action of the sun or of the light to obtain their perfect combination with the iodine, and the transformation of the iodine into iodohydric acid; but then the combinations and transformations are much slower. All substances having extractive principles, after having assisted in the transformation of the iodine into iodohydric acid or spirit of iodine, preserve nevertheless all their peculiar medical properties: iodohydric acid, with gum, lychen, iodohydric oils, or oils with the spirit of iodine, &c., are then obtained.

Iodohydrates.—By the same processes, and with the substances containing extractive principles, elementary combinations may be obtained with the different iodides, and these may be transformed into iodohydrates. One may also, by the same processes and with the same substances, create several iodohydrates without having recourse to the iodides.

Iodohydrate of quinine or spirit of iodine and of quinine.—First means:—dissolve some iodide of quinine, and mix that solution with the solution or decoction of a substance containing extractive principles; make the mixture boil: the iodine of the iodide will be transformed into iodohydric acid, and the product will be iodohydrate of quinine Magendie, or spirit of iodide and of quinine Magendie. Second means:—dissolve separately some sulphate of quinine or of pure quinine, and mix it with a solution of gum, or with any other decoction of substances having extractive principles; mix with this solution some sulphate of quinine or pure quinine, either iodine dissolved or iodohydric acid; heat the mixture by a balneum mariœ: iodohydrate of quinine Magendie, or spirit of iodine and quinine Magendie, will thus be obtained.

By the same processes and the same substances, and by employing the iodides of cinchonine or of quinidine, or by mixing solutions of cinchonine or of quinidine with the iodine dissolved, or with iodohydric acid, iodohydrates of cinchonine or of quinidine are obtained.

Iodohydrate of cinchona Magendie, or spirit of iodine and of quinquina.—Put in a glass vessel or flask some iodine and bruised bark of cinchona and water, and heat the mixture. The iodine combining elementarily with the hydrogen and the oxygen of the water, and of the extractive principles contained in the bark of quinquina, will form iodohydric acid and iodic acid. The iodic acid will dissolve all the alkaline and constituent parts of the quinquina; then, by the effect of the heat, it will be decomposed and transformed into an iodohydric

acid. The final result of the operation will be an iodohydrate of quinquina, containing all the acids and all the alkalis of quinquinas. For this iodohydrate to contain only the alkalis of quinquina it would suffice to deprive, first, the barks of the cinchona of their different acids in boiling them in carbonate of soda and water. Both these iodohydrates of cinchona may be obtained by making the heated iodohydric acid, diluted with water, act on cinchona bark entire or deprived of its acid.

Iodohydrated powder of cinchona Magendie, or powder with spirits of iodine and cinchona.—The iodohydrate of cinchona must be made to evaporate at a small degree of heat on the bark itself of cinchona, and, when the whole is dry, pulverize it; or powder of cinchona may be imbibed with the iodohydric acid Magendie, much concentrated;—dry it again, and pulverize it again.

Iodohydrate Magendie of quinine and iron, or of cinchona and iron, or spirit of iodine and quinine, or of iodine, cinchona, and iron.—To obtain this iodohydrate it is sufficient to add to the elements constituting iodohydrates of quinine or of cinchona a salt of iron, and especially the simple citrate of iron, or the malate of iron, which have no bad ferrugineous taste.

Iodohydrate of the acids of cinchona Magendie, or spirit of iodine, and the acids of cinchona.—Boil in water some cinchona bark: this decoction will only contain the acids of the cinchona and some extractive principles; filter the decoction, and add a portion of iodine, dissolved or not dissolved; boil the whole in a glass flask, till the iodine is transformed into iodohydric acid. The result will be iodohydrate of the acids of cinchona.

Iodohydrate of starch Magendie, or spirit of iodine and starch.—Mix with some starch some dissolved iodine. Put the mixture in a glass flask, and add to it a solution or decoction of a substance containing extractive principles. Heat the mixture. By the combination of the iodine with the hydrogen of the water and the extractive matters, the iodine is transformed into iodohydric acid, and thus the color and taste of the iodine will disappear, and the result will be liquid iodohydrate of starch. One may obtain solid iodohydrate of starch by imbibing starch with iodohydric acid Magendie. The starch is afterwards dried at a gentle heat, and it may then be again turned into powder.

Iodohydrate or biniodohydrate Magendie of sulphur, or spirit of iodine and of sulphur.—First means: dissolve some iodide of sulphur by the means generally used, or by iodohy-

dric acid Magendie. Mix this solution with a solution of gum, or with a decoction of substances with extractive principles. Heat the mixture: the iodide of sulphur will lose its color, its taste, its smell, and the product will be iodohydrate or biniodohydrate of sulphur Magendie. Second means: — triturate together one part of sulphur and four parts of iodine, dissolve them in iodohydric acid Magendie, and mix this solution with a solution of gum water, or with a decoction of a substance containing extractive principles. Boil the mixture: the result will be iodohydrate of sulphur.

Iodohydrate or biniohydrate of lead, of zinc, silver, gold, ammonium, arsenic, or mercury, or spirit, &c.—Dissolve some iodide of lead, or of zinc, silver, gold, ammonium, and arsenic, mercury, or biniodide of mercury, either by known means or by iodohydric acids. The simple iodide of mercury is best dissolved in the glycerine. Mix this solution with a solution of gum-water, or with a decoction of substances containing extractive principles. Boil till the iodine be transformed into iodohydric acid. The result will be an iodohydrate or a biniodohydrate of lead, zinc, silver, gold, arsenic, mercury, and ammonium. If, with the solution containing extractive principles, there be mixed at the same time iodide of mercury and iodide of arsenic, the result is a double iodohydrate of mercury and arsenic.

Iodohydrate of manganese, and of manganese and iron, or spirit, &c.—Put in a flask, first, iodine; second, sulphate or carbonate of manganese, or even peroxide of manganese; third, a solution or decoction containing extractive principles. Heat the mixture. The iodohydric acid, in being created, will dissolve either the sulphate or carbonate of manganese, or the peroxide of manganese. When all the iodine is transformed into iodohydric acid, the result will be iodohydrate of manganese. By adding in the flask a little iron filings, or peroxide of iron, or a salt of iron, the result is an iodohydrate of manganese and iron. If the citrate of iron or malate of iron be used, the iodohydrate of iron and of manganese will have no bad ferrugineous taste.

Iodohydrate of phosphorus, or spirit of iodine and phosphorus.—Put in a flask the normal proportions of iodine and phosphorus: moreover, a solution or decoction containing extractive principles. Heat not only to the transformation of iodine into iodohydric acid, but till the cessation of the white and opaque vapours, which proves the complete evaporation of the phosphorous acid. You can afterwards concentrate, more or less, the solution, as that of medical phosphoric acid. The result is iodohydrate of phosphorus.

Iodohydrate of iron, or spirit of iodine and of iron.—Dissolve some iodide of iron in a solution of gum water, or in the decoction of a substance containing extractive principles. Boil till the iodine be transformed into iodohydric acid. The result is iodohydrate of iron. But this iodohydrate of iron only contains and can only contain but $\frac{1}{6}$th of iron against $\frac{5}{6}$ths of iodine.

To obtain an iodohydrate of iron containing a greater proportion of iron.—Put in a flask, first, iodine, and then a solution of gum, or a decoction of a substance containing extractive principles; and afterwards a salt of iron, and especially citrate and malate of iron, in the desired proportions. Boil to the transformation of the iodine into iodohydric acid. According to the quantity of salt of iron which will have been added to the solution, the result will be an iodohydrate double, triple, or quadruple, &c., of iron.

All these different products above enumerated preserve, at the same time, the curative properties of iodine, and the properties of the different substances that have been combined elementarily with the iodine. One may then use these products to make syrups, lozenges, paste, biscuits, or medical chocolates, and medical oils or pomatums, waters for the toilet, injections, lotions, baths, aerated waters, powders for the teeth, or other powders; and in a word, prepare all the medicines in which iodine is necessary, either in its simple state or combined with other substances, as above described.

The patentee claims, First,—the production of an iodohydric acid, pure and stable, by the processes above indicated, under the name of iodohydric acid Magendie, or spirit of iodine Magendie. Secondly,—the production of the different iodohydrates or biniodohydrates above described. Thirdly,—the production of iodohydrated oils, as described. Fourthly,—the production of iodohydric powder of cinchona, as described. And, Fifthly,—the manufacture, by the aid of iodohydric acid Magendie, or of the different iodohydrates or biniodohydrates, above described, of medicines of all kinds in which iodine is necessary.

To Sir John Scott Lillie, *of South-street, Finsbury, for improvements in roads, floors, footways, and other like surfaces.*—[Sealed 28th April, 1853.]

This invention consists in the formation of blocks and slabs for the construction of roads, footways, and other like surfaces

of broken stone, gravel, wood, iron, metallic substances, or other hard material, conjointly or separately, which substances are caused to adhere by means of bituminous compounds, or other cements. The moulds may be formed of sand or of iron boxes with moveable sides and ends, and of any convenient size or shape (such as that of a parallelogram), two feet by one, and six inches deep. The moulds are filled indiscriminately with the said materials, or with alternate rows of wooden blocks, with the grain of the wood set perpendicularly, and the intervals filled with the before-mentioned materials cemented together. Metallic sand, borings, filings, or other small pieces of metal, may be added to any ordinary cement, or bituminous compound, for coating the surfaces of the blocks and slabs, which may be cast with grooves.

For heavy traffic, wooden planks, from one to two inches thick, should be attached to the bottom of the blocks, on which the small wooden blocks, when used, should rest; and short pieces of wood, embedded in a concrete or other foundation, to serve as an additional support to the ends and sides of the said large blocks. For footways, floors, and other like surfaces, slabs are formed from one to two inches deep, of the same combination of materials; and, when great strength is required, they are attached to boards of about one inch in thickness.

The patentee claims, Firstly,—the formation of blocks and slabs for constructing roads, floors, footways, and other similar surfaces, as hereinbefore described.

Secondly,—covering the said or other paving blocks with metallic sand, borings, filings, or other small pieces of metal, as hereinbefore described.

Thirdly,—the application of boards or planks for supporting the said blocks, and also blocks of stone in ordinary use for paving purposes, as hereinbefore described.

To AUGUSTUS BRACKENBURY, *of Camden-town, Gent., for improvements in precipitating the muriate of soda from its solutions in water.*—[Sealed 6th May, 1853.]

THIS invention of improvements in precipitating muriate of soda from its solutions in water consists in the direct application of air or gas to such solutions, whereby the aqueous part is evaporated, and the muriate of soda is thus caused to precipitate.

In separating muriate of soda from its solutions in water,

it has hitherto been usual to place the solution in pans, and, by the application of heat to the pan or containing vessel, so to evaporate the aqueous portion; but, in contradistinction to this, the patentee applies the heating medium direct to the solution, without the intervention of any substance.

In carrying out this invention, several modes of operation may be pursued: according to one method, the solution is placed in a wooden tank or other vessel, of large superficial area, in order to expose a great extent of surface, on which the evaporating agent is caused to take effect. For this purpose a disc of wood, or other plane surface, is placed, so as to float on the surface of the solution.

The specific gravity of wood renders it well adapted for the purpose; but other materials may be used,—taking care to render them sufficiently buoyant in themselves, or by counterbalancing. The floating disc should nearly equal the area of the tank, and is made with an opening in the centre; over which an inverted chamber is placed, and rises some three feet above the disc. This chamber is rendered close above the disc,—the only ingress or egress being from below the disc or float. The float rises and falls with the level of the solution, and should have suitable guides to maintain its parallelism of motion, and keep it in its position in the tank. A tube rises up from the bottom of the tank or containing-vessel into the inverted chamber,—such tube being of sufficient height to be at all times above the surface of the solution. This tube is for the purpose of introducing the heated air or gas which is to effect the evaporation of the fluid. The air is heated to a proper degree for evaporation by passing it through heated tubes, or over coke or other suitable fires; it is then forced by pumps, or other suitable means, through the rising tube in the tank into the inverted chamber occupying the centre of the disc. The pressure thus created in the chamber presses on the surface of the solution in the tank—causing the disc or floating surface to rise, and the fluid in the chamber to be depressed, until the air escapes below the disc. In this way the air passes off radially in every direction from the inverted chamber; thus spreading a thin film of heated air over the area of the tank, which air is thus kept in close contact with the solution. The air having travelled from the centre of the disc to the periphery, escapes thence into the atmosphere, and from being thus kept in close contact with the solution for a considerable time, it rapidly absorbs and carries off the aqueous portion thereof. The evaporation of the aqueous part necessarily causes the muriate

of soda to deposit in the bottom of the tank. By continuing the action of the heated air, the whole of the aqueous part of the brine may be driven off with equal facility; and the disc accommodating itself to the varying level of the fluid, always insures a uniform effect. Instead of the ingress tube rising in the tank, the air may be conducted through a flexible or sliding tube, carried in at the top of the dispersion chamber.

Another mode of evaporating water holding muriate of soda in solution, consists in the application of a revolving drum for the purpose of exposing a thin film of the brine to the action of the heated air or other vehicle of caloric. For this purpose the solution of muriate of soda is placed in a wooden or other tank of suitable size, and erected over a drum, having its axis horizontal, and at such a height that the periphery of the drum dips slightly into the brine below. The supply of brine should be regulated so that it maintains as nearly as possible a uniform level in the tank, which in this case need not be of much greater area than the space occupied by the drum. The drum is composed of two or more circular discs or frames supported from the axis, and having suitable stays between the peripheries of each. Woollen or cotton cloth is stretched between the circular frames, and forms the periphery of the drum, which dips into the solution. The sides of the drum are thus enclosed, with the exception of an aperture in the centre, on one side. The drum should be overhung in its bearings from the opposite side. A rotary motion is given by its axis on one side, while a central aperture is provided at the other, whereby to introduce heated air, for the purpose of evaporation, as hereafter described. The air, which may be heated by passing through pipes, or over a coke or other incandescent fire, is forced into the drum with a slight pressure; the drum having, at the same time, a slow rotary motion imparted to it while dipping in the brine. The cloth of the periphery, dipping in the tank, becomes saturated with and carries up a quantity of the brine; which, as it rises, becomes exposed to the action of the heated air in the interior. The rarefaction of the air, and the slight pressure exerted in its introduction to the drum, causes it to ascend and pass through the meshes of the cloth; during which it absorbs the aqueous part of the solution, which is thus rapidly driven off, and the muriate of soda is left in the cloth, As the rotation of the drum progresses, this deposit of the salt is carried down into the solution below, becomes washed off, and deposits in the bottom of the tank. The brine being thus acted on in very small quantities, and exposing a large surface to the

direct action of heated air or other evaporating medium, great rapidity of evaporation is effected. The motion of the drum, and the transmission of the heated air, may readily be adjusted, so as to utilize the whole of the heat.

Instead of introducing the heating medium into the drum as aforesaid, the heat may be generated in the drum by the combustion of gas. The air-duct remains as before for the admission of air to the drum at the centre. The gas is admitted also at the centre by a suitable pipe, and ignited at several small jets, at a sufficient distance from the upper part of the cloth periphery to prevent contact or injury by the flame. The combustion of the gas rarefies and heats the air inside the drum, which ascends through the saturated cloth with the effect before described. The passage of the heated air may be facilitated by introducing the air, to support combustion, under a slight pressure, by means of a fan or other suitable apparatus.

The patentee claims the several modes and arrangements of apparatus for evaporating the aqueous part of solutions of muriate of soda, and facilitating the deposit of muriate of soda, as hereinbefore described.

To Henry Leachman, *of Compton-terrace, Islington, for improvements in the manufacture of iron,—being a communication.*—[Sealed 6th April, 1853.]

This invention consists in treating iron by means of certain materials, or a certain combination of materials, for the purpose of producing a more plastic and malleable iron than heretofore.

For this purpose, common brick-dust, salt, black oxide of manganese, and pig-iron, are employed, as hereinafter mentioned. The first three mentioned materials are mixed together in the following proportions; that is to say:—

		lbs.
Common brick-dust	-	120
Common salt (pounded fine)	-	600
Black oxide of manganese	-	280
Making together	-	1000 lbs.

These three materials are to be thoroughly intermingled and reduced to a state of powder, and used in the boiling process to which the pig-iron is usually subjected. When

the metal is thoroughly melted and commences to rise, the powder is to be added, in quantities varying from 4lbs. to 10lbs. weight, according to the quality of the metal. If the metal is of a very poor quality, 10 lbs. weight to the heat of 420 lbs. of metal, is used; and as the quality is superior, so less is to be used proportionately, up to 4 lbs.,—in doing which, the manufacturer must be guided by experience. The powder should be added to or thrown into the metal all at once; at the same time stirring it briskly about, so that the whole gets thoroughly mixed; and the iron is then ready for use. Calcined clay may be used instead of brick-dust.

The patentee claims the treating of iron by or with a compound of materials, as above described.

To Aristide Michel Servan, *of Philpot-lane, for improvements in treating fatty matters to render them suitable for the manufacture of candles.*—[Sealed 27th May, 1853.]

This invention consists in acting on elaidine or elaidic acid (which is the substance formed by acting on fatty bodies with the gas formed by acting on nitric acid with an organic body) with a variable proportion of sulphuric acid, according to the quality of the elaidine; thus producing fatty matters more suitable for making candles, when distilled by steam at its natural temperature.

In carrying out this invention the patentee takes for instance, 1000 lbs. of the fatty body to be operated upon, and places it in a suitable vessel, so arranged as to prevent the escape into the air of the gas employed in the process; and should the fat to be operated upon be naturally solid, he melts the same by means of steam, or in any other convenient manner. When this is accomplished, he causes nitrous acid gas to pass through the fluid fat during about three hours; which gas may be obtained by the decomposition of nitric acid, by means of an organic body, such as sawdust; but other means of generating the nitrous acid may be employed; and it has been found that the gas produced by the action of one pound of sawdust on three pounds of nitric acid, will suffice to produce the change required in 1000 lbs. of fat or oil. When this process is complete, the fatty body, if originally neutral, as for instance tallow, will have been converted into the substance ordinarily known as elaidine. But should the substance operated upon have been originally acid, as for instance oleic acid, the result of the process will be the formation of elaidic acid. In either

case the transformed fatty matter is washed in water until every trace of acid is removed, and the fat is then raised to a heat sufficient to dry the same. When in this state, to every 1000 lbs. of fatty matter from 100 lbs. to 170 lbs. of sulphuric acid, of a density of 66° Baumé, is added, according to the nature of the fatty body to be treated. The fats which have the lowest melting points will require the largest proportion of acid; but a little experience will soon teach the workmen the quantity of acid necessary to produce the best effect. This acid is allowed to trickle gradually during eight hours into the fat, which should be kept in a gently heated state; and after all the acid has been introduced, the temperature should be raised to about two hundred and thirty degrees,—the whole operation occupying about sixteen hours: after which, the black matter which is formed by the action of the acid, is allowed to settle, and the clear fat is drawn off: the product is then washed until all trace of acid is removed, and then it is dried by heat, as before. This substance, after it has been distilled in a still, heated by any of the well known means, and from which the air is excluded by means of steam or otherwise, is very suitable for the manufacture of candles.

The patentee remarks that he sometimes mixes with the more fluid oils, before the commencement of the process, a certain quantity of resin to obtain a harder product; but he does not find it to be advantageous to exceed the proportions of three parts of resin to five of oil; and in such a case he employs only five per cent. of sulphuric acid for the acidification.

The patentee claims the acting on elaidine or elaidic acid (by whatever means the same may be obtained), by means of sulphuric acid.

To Robert Walter Swinburne, *of South Shields, glass manufacturer, for improvements in the manufacture of glass.*—[Sealed 3rd May, 1853.]

This invention consists in a mode or modes of casting or manufacturing glass or other vitreous material in a melted state, by means of cisterns or casting vessels, which are placed in the furnace or kiln whilst being filled or charged from the melting pots, for the purpose of avoiding the diminution of the heat of the melted glass or metal before casting, which is consequent upon the ordinary mode of casting plate-glass. In carrying out this invention the patentee places near to each melting pot in a furnace a cistern or casting vessel of such a size that, when filled, it can be conveniently removed

from the furnace, and taken to the casting table. Each cistern is placed close to the melting from which it is to be filled or charged, in order that the melted glass or vitreous metal contained in the melting pot, or a portion of it, may be transferred without waste, by a ladle or other convenient means, from the melting pot into the cistern. When the pots contained in a furnace have been charged, and the glass or vitreous material in them has been melted, and is ready for use, a sufficient charge or quantity of the melted material is transferred, by means of an iron ladle or other convenient implement, from each pot, into an adjoining cistern or casting vessel, which has been previously heated in the furnace. The cistern into which the melted material is thus transferred, remains in the furnace or kiln during the whole time that the operation of charging is going on, and until the workmen are ready to take it to the casting table. A cistern or casting vessel being thus charged, and the casting table ready, the workmen withdraw the cistern from the furnace, and take it quickly to the casting table, and cast the contents of it upon the table, and roll it into sheets or plates in the usual way, and immediately return the cistern to the furnace, and place it near to the same or some other melting pot ready to receive another charge, to be dealt with as above described.

The melted material is then continued to be transferred from the melting pots into the casting cisterns, and cast into plates or sheets of glass or vitreous material, in the manner above described, until the whole charge contained in each of the melting pots in the furnace has been exhausted; after which, the pots are to be refilled and heated, until the contents are ready for casting, as before.

The patentee remarks, that the furnaces must be furnished with convenient apertures through which the casting vessels may be with facility introduced into and withdrawn from them; and they must also be furnished with doors or other convenient means for closing such apertures when they are not required to be open. The melting pots may be the same as those which are ordinarily employed for the melting of the materials used in the manufacture of glass.

The patentee claims the mode or modes of casting or manufacturing glass or other vitreous material, by means of casting vessels which are placed in the same furnace with the melting pot whilst being filled, in manner and for the purposes hereinbefore described.

To John Blair, *of Ducie Bridge Mill, Manchester, for the application of steam-power to the working of railway-brakes.*—[Sealed 21st May, 1853.]

In carrying out this invention for applying steam-power to railway brakes, the patentee proceeds as follows:—

Under the foot-plate of a locomotive engine, and attached thereto by stays, an ordinary steam-cylinder, with piston, is affixed. Upon that end of the piston-rod which projects through the cylinder cover is a broad flange or surface, similar in make to those now in use on railway carriages, called "buffers." The cylinder is placed in the centre of the foot-plate, and the piston-rod projects in the direction of the engine tender.

The engine tender, and every carriage respectively, carries its own shafting and brakes; namely, underneath the tender, and lying along its centre, is a shaft, terminating at both ends of the tender with a broad surface, flange, or buffer: these buffers or flanges must project and lie at equal distances from the regular buffers now in use on railway tenders and carriages, and will have the appearance of a third buffer to each end of the tender. Attached to this shaft are strong arms or bars of wrought-iron, for carrying the brake blocks, which are placed at such distances from the wheels of the tender or carriages as will just suffice to allow the wheels to revolve without interruption. Each carriage also carries a similar shaft, terminating at opposite ends of the carriage with flanges or buffers, and having also the appearance of a carriage with three buffers instead of two. Attached to the shaft under the carriage (in the same manner as already described with respect to the tender shaft) are strong wrought-iron bars, with brake blocks on the end of each, and also lying close to the carriage wheels, but without interfering with their revolutions.

The shaft already mentioned works in sockets or steps, and moves backwards and forwards, placing on, and taking off, when necessary, the brakes, to and from the wheels. When a train of carriages, with tender and engine, are connected, the buffers upon the ends of each carriage-shaft will meet, and thus form a continuous line of shafting throughout the train. So also will one end or buffer of the tender-shaft meet one buffer of the carriage-shaft nearest thereto; and so also will the other buffer of the tender-shaft nearest the locomotive engine meet the flange, broad surface, or buffer, upon the piston-rod; and thus a continuous line of shafting, commencing at the piston-rod buffer, and extending along the tender and whole train of carriages, will be formed.

When a train is to be stopped, the engine-driver will turn off the steam from the driving-cylinders, and admit it at the same time into the third cylinder, termed the "brake-cylinder," through a feed-pipe, so constructed as to convey steam from the locomotive boiler into the bottom part of the brake-cylinder. Upon the admission of the steam, the piston-rod will project, come in contact with the buffer-shaft of the tender, and the tender buffer-shaft with next carriage-shaft, and so along the train; whereupon, the shaft being pressed backward in its sockets or steps, will immediately apply the brakes to the wheels of each and every carriage throughout the train, and immediately arrest the speed thereof. In order to start the train the engine-driver has merely to shut off the steam from the brake-cylinder, and admit it into the driving-cylinders; whereupon the shafts and brakes will resume their regular position and allow the wheels to revolve.

The engine-driver can limit the quantity of steam to be admitted into the brake-cylinder, and thus regulate the pressure of the brakes upon the wheels.

The patentee claims the application of steam-power to the working of railway-brakes; also the brake-cylinder and piston and longitudinal shafting; and, inasmuch as the brake-cylinder can be constructed in other shapes not cylindrical, without altering its effect upon the brake, he claims it in any shape or form, if used for the purpose of supplying steam-power for the working of railway-brakes.

To JOHH BETHELL, *of Parliament-street, Gent, for improvements in the manufacture of flax.*—[Sealed 14th April, 1853.]

THIS invention consists in dissolving out, without fermentation, the gummy, mucilaginous, and pithy substances contained in flax straw.

In carrying out his invention, the patentee places the flax straw in a vat or vessel like a brewer's mash-tub, which has in it a coil of steam-pipe, and covers the straw with hot water, not exceeding the temperature of 105° Fahr.; he then covers over the vat, and allows the straw to steep for some time (about two hours), during which time the straw is agitated or stirred about as the brewers stir about the malt in their mash-tubs; and the temperature is kept up to 105°, or rather more. After about two hours, the temperature is increased, either by passing steam through the coil of pipe, or

by adding water of a higher temperature, so as to increase the heat of the water gradually up to about 120 degrees, and then gradually up to 200° Fahr. The straw having been immersed for from six to ten hours, the liquor is drawn off, and a second charge of fresh water, heated to about 120 degrees, is added, and the steeping is continued for some time longer,—the temperature being gradually increased up to 190 degrees, as before. If, on drawing off this second charge of liquor, it is found that the flax is not sufficiently prepared, more charges of hot water are added, until the whole of the gummy, mucilaginous, and pithy matters are dissolved out of the straw. The flax is then taken out of the mash-tub, dried, and scutched in the usual way.

Instead of using one mash-tub or vat, several vats may be used, one above another, each of which vats may be filled with flax, and the liquor from the first and top vat run into the second, and so on, until all the gummy, mucilaginous, and pithy matters are extracted, and a very strong solution is obtained.

At the commencement of the process, the straw must be kept in water, not exceeding 105° Fahr., for about two hours, whereby the albuminous matter will be dissolved out. If the water was hotter at first, the albuminous matter would be liable to coagulate, and would not afterwards so easily dissolve; but after the albuminous matter is dissolved out, the temperature is to be gradually increased up to 190°, whereby the pith in the straw will be dissolved, and the flax fibres liberated.

A little soda, or liquor ammonia, or other alkali, is sometimes added to the water before it is used, to make the water feel soft; which enables it to dissolve the mucilaginous matter in the flax straw more easily. The solution or extract, thus obtained from the straw, may be employed for mixing with the food of cattle.

The patentee claims, the using the process above described (which is similar to the mashing process used by brewers to extract beer from malt), instead of the well-known retting process; for the purpose of dissolving out, without fermentation, all the gummy, mucilaginous, and pithy matters in the flax straw, and thus preparing it for the usual and well-known process of scutching.

To George Turner, *of Bradley-terrace, Wandsworth-road, and* Robert Holloway, *of St. James's-street, Hatcham New Town, Old Kent-road, for improvements in the manufacture of unfermented bread; which improvements are also applicable to other purposes as a substitute for yeast.*—[Sealed 27th April, 1853.]

This invention relates to the use and application of certain vegetable matters or ingredients, and the combining and mixing together of the same, so as to form a preparation or mixture to be used as a substitute for the yeast of commerce,—such as is commonly used in and for the manufacture of bread, biscuits, puddings, and a variety of other purposes to which yeast is applicable.

The ingredients and proportions thereof employed by the patentees in the manufacture of the aforesaid preparation or mixture are as follow:—

Tartaric acid of commerce - -	120 lbs.	weight.
Bicarbonate of potash - - -	144 lbs.	„
Loaf sugar (pounded) - - -	30 lbs.	„
Finest Patna rice (ground fine)	116 lbs.	„
East India arrow-root - - -	30 lbs.	„

Or, should arrow-root not be easily obtainable, about 60 lbs. weight of the best Carolina rice, ground fine, are employed in lieu thereof. These matters or ingredients are intimately mixed together in a suitable vessel, in the following order and manner; that is to say:—The tartaric acid is first mixed with the Patna rice, and the compound is then passed through a fine sieve (of about gauge No. 60), or through a machine, such as is commonly used for dressing flour through; and it is then left to stand for twenty-eight days, in a dry situation, to allow the acid to be well coated by the rice, previous to mixing with the following ingredients:—The East India arrow-root, or Carolina rice (ground fine), is next mixed with the bicarbonate of potash and pounded sugar, and allowed to stand for twenty-eight days in a dry situation, for the purpose above mentioned. After which time the whole of the above-named matters or ingredients are well mixed and incorporated together, by being passed through a fine sieve or machine, as before stated. The preparation or mixture is now ready for use, and may be employed in and for the manufacture of unfermented bread, and for other purposes. In making unfermented bread, to every pound weight of wheaten flour one tea-spoonful of the preparation or mixture lastly above described is added; and after being mixed thoroughly with the flour in a suitable

vessel, the whole is sifted through a fine sieve. A small quantity of salt is next added, according to taste; and the entire mixture is made up with about half-a-pint of cold water, and baked in a quick oven. To make cake which shall resemble pound-cake, the same may be effected without the use of eggs, by preparing one pound of flour in the manner above stated, adding thereto about half the quantity of butter commonly used, and of currants and sugar according to taste: the whole is then mixed together with half-a-pint of cold water, and baked in an oven in the usual way. In mixing the above ingredients together, great care should be taken to have the water perfectly cold; and in applying the above mixture to the manufacture of biscuits, and for every other similar purpose, excepting pastry, precisely the same proportions of the mixture to the flour, as above stated, is used. But for pastry, it will only be necessary to employ half the quantity of the mixture to the same quantity of flour.

The patentees claim the use and application of the matters or ingredients herein stated, and the combining and mixing thereof in the manner hereinbefore particularly described and set forth, as constituting "Improvements in the manufacture of unfermented bread; which improvements are also applicable to other purposes as a substitute for yeast."

Scientific Notices.

On Property in Designs and Inventions in the Arts and Manufactures,—by Thos. Webster, M.A., F.R.S, Barrister-at-Law.

The Commissioners of Patents' Journal.—By Authority, No. 1.

It may seem strange to those who are unaccustomed to study the fluctuations of public opinion, that, notwithstanding the lengthened parliamentary enquiries which have been carried on in reference to letters patent for inventions, and the endless discussions which these enquiries have given rise to in the public journals and elsewhere, no sooner is the long desired reform effected in our patent laws than we find an earnest and able advocate for the recent changes impelled forward to support the principle and defend the policy upon which all patent laws are based: for such is the design of the work which stands first at the head of this article. Public opinion has been compared to the pendulum of a clock, which moves towards extreme points, in obedience to opposing forces, but

has naturally a tendency to gravitate to an intermediate position. Like a pendulum, also, it is calculated to effect, by its pulsations, some very palpable results. Now, as the reasoning and far-seeing powers of the multitude are never more likely to be clouded than when self-interest is presented in an enticing garb, it would appear only necessary, for the diversion of public opinion from persistence in a sound and long-received principle to the acceptance of a new and fallacious one (always supposing the matter in hand to be sufficiently abstruse to ensure a wide spread ignorance of its general bearings),to paint a bright and dazzling picture of the immediate advantages that would result from a change of policy, and converts will, to a certainty, crowd around the new teachers, and accept their doctrines with avidity. Such, we should suppose, is Mr. Webster's opinion, or why put forth all his strength to crush the babblers, who are now railing against the legal rights of inventors. How, where, or when this notion, antagonistic to patent property, and the inventor's claims to remuneration, took its rise it is difficult to determine; or what prospect of advantage the agitators propose to themselves, more than a little unenviable notoriety, we are at a loss to conjecture; unless it be the desire which some men naturally feel to act the part of the fox with a firebrand at his tail. In his attempts to establish the justice and reasonableness of granting to inventors an exclusive protection, for a limited period, in the use of their discoveries, Mr. Webster first considers the origin and rights of property, and shews what may, and what may not, be made the subject of property. Having thus cleared the ground for a fair consideration of his subject, he proceeds to shew, on the authority of writers on jurisprudence, ethical philosophy, and political economy, that, in common justice, the rights of property must be recognised in the creations of the mind when embodied in a practical form, so as to be available to mankind,—whether in books, music, painting, designs, or inventions in the arts and manufactures.

"To deny," says our author, "to the cultivated mind or educated man property in the productions of his peculiar labor, or of the exercise of those powers by which he is distinguished from his fellows, and which it has been the object of his education to improve to the utmost, is a proposition which in terms has as yet found no advocate, although the alleged opinions recently advanced on the subject of patent rights for inventions would appear to lead inevitably thereto. To deny to the creations and labor of the mind that property and protection by the civil power which is given to the skill of the hand or to bodily labor, is, in effect, to make intellectual of no account as compared with manual labor, and to give

a predominating and overwhelming influence to capital, and those other representations of accumulated labor which may be profitably enjoyed without any fresh creations of mind or exercise of inventive faculties.

"If, as has been above stated, occupancy and possession be the fundamental principles of the origin and rights of property, the creations of the mind belong to their author in a peculiar and especial sense. He has sole and exclusive power and possession over them until embodied in some material form, and communicated by publication in such form to others. Further, the possession of such property has this peculiar claim derived from the nature of the subject; namely,—that the subject-matter of such property did not exist like land, the air, or wild animals, as part of the common stock provided for all mankind: such property is, in the strictest sense of the term, a creation, and not a discovery or finding of something created by the great Author of all things, and already existing. The thoughts of man are peculiarly and essentially his own; and unless embodied in some practical form, and communicated by publication to the world, would die with their author. To prevent this, and ensure their preservation and publication, may be regarded as part of the policy of the law which will be further dwelt upon hereafter."

The above extract will shew the drift of Mr. Webster's argument, which, although thoroughly logical, and such as one might expect from a writer of great research, is hardly of the kind to impress the popular mind. His design is, as we have said, to crush the assailants of the principle of granting exclusive rights in inventions and discoveries,—and to this end he comes heavily armed and well prepared for the conflict; but he has to use his weapons against an unseeen foe, inasmuch as he finds no arguments to combat, no theories to demolish. All that appears to have been advanced in hostility to patents is to the effect that, if such privileges were once useful, that time has passed away; that this is an age of free trade measures, and monopolies of all kinds should be abolished; that the greater number of patentees are pecuniary sufferers by their inventions, and that, therefore, it would have been a benefit to such men if the patent laws had not existed; that masters are very liberal now-a-days, and would reward their workmen by increased wages if they beneficially applied their inventive powers to their master's service; that manufacturing firms, by producing new things, would gain a great reputation, which would ensure an increasing demand for their productions, and thus afford them an advancing profit proportionate to their deserts; that patents obstruct manufacturers from availing themselves of the best known means of arriving at certain desired results; and that for these and other like

cogent reasons the patent laws ought, at once and for ever, to be banished from the statute book. It is remarkable that the first, in point of rank, among the disciples of this school of thinkers, if not in point of date as a public advocate of these principles, is the nobleman to whom, more than to any other legislator, we are indebted for the new law under which patents for inventions are now granted. As chairman of the Lords' Committee on the Patent Bills of 1851, Earl Granville had certainly an excellent opportunity of extracting from the witnesses who were examined a statement of all the evils springing out of, or pertaining to, the patent laws; and it is not too much to say—for every attentive reader of the printed evidence must bear us out in our assertion—that the questions put to the witnesses were, in great measure, dictated from a foregone conclusion. We must not therefore be surprised, that portions of the evidence contained in the blue book tell against the inventor's privileges, but rather feel astonished that so little was extracted by the close and well-directed fire of questions to which the witnesses, altogether unprepared for such an ordeal, were unexpectedly subjected. In asserting that this printed evidence is, from the cause assigned, scarcely a fair criterion of the opinions of the witnesses brought under examination, we do not thereby intend it should be inferred that Mr. Webster, by pressing into his service so much of the evidence as he has done, has given cause for his deductions to be received with caution; but that what has been relied upon as hostile to the law of patents is, with an exceptional case or two, more so in appearance than in reality. Throughout his argument, Mr. Webster confines himself to a defensive position; but it is manifest that, although this mode of dealing with a difficult subject is the most satisfactory to thinking men, yet with the multitude, whose immediate interests may be supposed to be antagonistic to individual rights, it can have but little weight; and upon that ground, and that ground alone, we question the policy of his taking up the gauntlet and entering the lists upon such a cause. A far more telling argument, in favor of the patent laws, is presented in the first number of a bi-weekly journal, published by authority of the Commissioners of Patents; wherein, amongst other matters interesting to inventors, a summary is given of the number of patents which have emanated from the several towns in Great Britain and Ireland since the commencement of the new law. Let inventive industry proceed at the pace herein indicated, and patentees may soon laugh to scorn such feeble attempts as are now being made to subvert their rights: let more of the firesides

of our artisans be directly, as they now are all indirectly, interested in this species of property, and we shall see there more of happiness and contentment; for the mechanic will then have other sources than the labor of his hands to depend upon for his daily bread, and he will have the satisfaction of knowing that he has added something to the ever accumulating stores of the applied sciences, which are destined to play a most important part in the advancement of civilization.

INSTITUTION OF CIVIL ENGINEERS.

January 10th, 1854.

JAMES SIMPSON, Esq., President, in the Chair.

The proceedings of the evening were commenced by an Address from the President, on taking the Chair, for the first time, after his election.

After expressing his sense of the distinction conferred on him, by his election to the post of President, he embraced the opportunity of acknowledging the debt of gratitude he in common with many other members of the profession, owed to the Institution of Civil Engineers, where they had first found a field for the exhibition of their talents, and had there formed the valuable and lasting friendships, to which might be attributed the good feeling prevalent in the profession.

He then alluded to the difficulties formerly experienced by young engineers, at the commencement of their career, chiefly from want of opportunity of contact with, and experience of, the proceedings of the older practitioners; contrasting it with their present freedom of communication with the seniors, at the meetings of the Institution, where all met on a footing of equality, and with a predisposition to afford the aid, or advice, that might be requested.

He then gave a slight sketch of the professional career of his father, who entered the metropolis as a millwright in 1778, and before his decease, had raised himself to eminence as a civil engineer, and was the coadjutor of Smeaton, Jessop, Watt, Rennie, Telford, and others. Under him Mr. James Simpson commenced his practical career, of which he gave a rapid outline. As a very old member of the Institution—having been elected in 1825, and chosen a member of council in 1826—he ventured to give some sound practical advice on the subject of agitation in societies.

He then gave a succinct account of the great engineering works in progress in India, Egypt, Sweden, Norway, Denmark, Canada, Australia, Cuba,—on the European continent generally, and in Russia; chiefly under the direction of members of the Institution.

The maritime works on the Thames, the Tyne, the Severn, the Clyde, the Avon, &c.,—the harbours and docks at Harwich, at Dover, at Guernsey, Jersey, Alderney, Portland, Holyhead, Plymouth, Leith, Hartlepool, and other places; the works at the Norfolk Estuary, the reconstruction of the Bishop's Rock Lighthouse, and other important labors of civil engineers, were also noticed.

He also alluded to the subject of screw propulsion, and the valuable, and hitherto unrewarded labors of Mr. F. P. Smith, as triumphantly demonstrated in the late naval review at Spithead; and the general adoption of the system for an improved class of steam and sailing vessels.

The new system of propulsion invented by Ruthven, and introduced by Clark, for the Deep Sea Fishing Company, was also mentioned.

The improvements in the supplies of gas and water, particularly of the latter, were noticed, in contradiction to assertions made "by authority," that little or no amelioration had taken place.

A short history of the waterworks of the metropolis was given, to shew that the extensions and ameliorations of filtering and high service had closely followed the facility for obtaining cast-iron pipes in large quantities, and at a reasonable rate; and that the improvement in steam-engines and pumping-machinery had also produced corresponding advantages.

Attention was directed to the present state of the sewerage of cities and towns, and also that of the drainage of farm lands. For the former it was urged, that more had been done than was generally admitted; and for the latter, the partial steps hitherto taken were contended to be insufficient, unless the system was introduced on a larger scale, and extended to arterial and trunk drainage, and the improvement of the principal drains and watercourses in the lowlands.

The regulations for the prevention of the nuisance of smoke, from steam and other boilers, were noticed, and the various trials already made were examined.

The present general employment of members of the profession was alluded to with pleasure, as demonstrating that the science and practice of engineering had not experienced any check; and with a tender, to the junior members of the society, of any advice or assistance in his power, the President concluded his address.

January 17th, 1854.

The discussion on Mr. HARRISON's paper, "*On the drainage of the district, south of the Thames,*" read before the Society, Dec. 6th, was now renewed.

After reviewing the objections to the proposed main sewer of 8 feet diameter, and its tributaries or feeders, it was explained, that the general dimensions had not been assumed as fixed, but

only as data to argue upon; the practical area, as well as the ultimate direction, remaining to be settled by more careful investigation. It might be preferable to construct two parallel sewers, to be used and cleansed by flushing, or otherwise, alternately; or used for fecal matter, or for rain water, alternately.

As to cleansing, it was objected, that the velocity of $1\frac{1}{4}$ miles per hour would be insufficient, and a scouring power of 3 miles per hour was demanded by one authority, whilst another stated, that a sewer constructed on a dead level, on account of the difficulty of obtaining outfall, was effectually flushed by having gates at intervals of 1600 feet. At Eton, the main sewer was stated to be horizontal, but having a good supply of water constantly running through it, no deposit occurred. The quantity of water that could be brought to bear on the Lambeth main-sewer being unlimited, and used at each tide, it was argued that the velocity of $1\frac{1}{4}$ miles per hour would suffice to keep it clear.

The plan of the double reservoirs for the discharge of the sewage into the Thames, would obviate any objections. One reservoir would be filled at low-water, to that level, from the river, ready to receive the sewage; the other would be filled with the sewage, to a height of 2 feet to 6 feet above that level. Into this latter, as the tide rose, the water would be admitted,—the gates at the upper end being closed. At the turn of the tide, the lower gates being opened, the contents of the reservoir would be permitted to flow freely out, carrying away the whole of the sewage matter accumulated during the past $12\frac{1}{2}$ hours; and, commencing its exit at the turn at the top of the tide, the matter would never return to within half-a-mile of the spot whence it started. The capacity of the reservoirs being regulated accordingly, there would be no objection to discharging at low-water, in cases of heavy rain, as then both reservoirs would be used simultaneously for receiving the well-diluted sewage.

Even admitting certain valid objections to a flushing system, it was agreed to be more simple, and quite as effectual as the pumping system. Whilst it was decidedly more economical and less liable to derangement.

Allusion was made to the present comparative levels of the river Thames and the Lambeth district; and it was suggested whether the bed of the Thames, like that of the Mississippi, the Po, the Arno, and other streams, had not been artificially raised by alluvial deposit; and if so, whether a certain extent of embanking of the shores, so as to restrict the channel, without too much reducing the area for flood waters, would not deepen the centre and afford a better outfall for the sewers at any given point.

Instances of the employment of the liquid sewage for agricultural purposes were mentioned, and it was urged, that the introduction of water supply for habitations, should always be followed by utilizing the sewage from them, and that thus a valuable interchange might be established.

To this it was replied, that the comparative value of the rental of agricultural land, and of that of the same area covered with buildings, would shew, that no parallel existed between the water supply to houses and that of pumping liquid manure, for agricultural purposes, and that the schemes for that purpose were, with few exceptions, fallacious.

As to the general question of the drainage of London, it was argued, that with a good system of intercepting sewers, the gravitation plan could be adopted, for the upper districts, on both sides of the river; and on the north side, the whole sewage might be so disposed of; but on the south side, on account of the deficiency of fall, it would probably be necessary to resort to a system of pumping the low sewage, at some point, say at Deptford Creek, and there lifting it to such a height as to give the requisite fall from thence, by a sewer, into reservoirs, as proposed by Mr. Harrison; whence the matter should be delivered into the river, without any deodorizing, at a point low down, at the first turn of the tide from high-water, so as to preclude the possibility of any pollution of the stream above the point of the admission of the sewage. It was contended, that the same skill by which steam power was enabled to be continuously used, for long sea voyages, could preclude any but very remote chance of casualty from a derangement of the pumping apparatus, and that in the cases of excessive rainfall, flooding might be prevented, by permitting the present outfalls into the river to be used.

As to the general question of deodorizing, it was argued, that like the employment of the diluted sewage for agricultural purposes, the scheme might be feasible for small towns, but that the immense quantity proceeding from such an area of houses as in London, appeared at present to preclude the general adoption of the system.

Up to the present time, it appeared, that all the plans proposed for the drainage of the southern district were defective in providing capacity of main sewers for conveying away the excessive rainfall, the amount of which were quoted to the meeting from returns supplied from the Royal Observatory at Greenwich.

It was shewn, that at present, when a heavy rainfall occurred simultaneously with a high tide, the districts by the York-road and along the river side down to Bermondsey, and lower down, were flooded from the river, which flowed over the surface and down the gullies into the sewers—whence it flooded the houses. Therefore a greater pumping power would be required than had been mentioned, if the habitations were to be guaranteed from casualty, as they should be, under a new and expensive system. It was contended, that the outfall should be extended even below Greenwich; as any system of sewerage for the southern districts should be permanent, and allow for any amount of extension of buildings to the eastward.

It was hoped, that the facts elicited by the discussion would be found serviceable, in determining the ultimate system to be

adopted; and that special care would be taken to avoid the fallacies, which it was contended had been promulgated in some of the documents emanating, "by authority," from the General Board of Health,—particularly in the "Minutes of information, collected with reference to works for the removal of soil water, or drainage of dwelling-houses, public edifices, &c." (1852).

Specimens were exhibited of Mr. Austin's perforated bricks and blocks, with dovetailed joints, for straight work, and for circular or oval culverts. Their merit was stated to consist in imparting great strength and solidity to the work, with parallel joints,—using less mortar, or cement, and enabling great speed to be employed in laying the blocks.

The larger perforations were stated to be intended for ventilation, for channels for warmed air, or for passing holding-down bolts, where the bricks were used instead of stone, for masses to resist impact or strain.

A simple and effective trough, with a cover, for containing the underground wires of the electric telegraph, was also on the table; and in the ante-room there were several ingenious sewer-grate traps, and other accessories for sewerage works, the invention of Mr. Austin and Mr. Jennings.

January 24th 1854.

The paper read was a "*Description of an improved inclined plane, for conveying boats to and from different levels of a canal.*" By Mr. J. Leslie, M. Inst. C. E.

After alluding to the successful inclined plane, established by the author, at Blackhill, near Glasgow, on the Monkland Canal, and describing the difficulties to be overcome, and the points essential for the good working of such lifts, the paper proceeded to propound, as the simplest modification, in cases where there was a scarcity of water, and where vessels would bear being taken out of the water, to have two uniform inclined planes, descending each way, from a culminating point or summit, placed at a suitable elevation above the water in the upper reach. Each of the inclines was cut down for a distance from the summit equal to the length of a carriage, fit to carry the largest boat, and a railway laid on a lower level in a segment of a circle vertically; the segment being traced from a centre so placed that lines parallel to, and equidistant from, the inclined planes, should each be a tangent to the circle, at a point half way between their summit or apex (if produced) and the terminations of the segmental rails.

On this curved railway there was a lower or subsidiary carriage running on a number of rollers, so as to have no friction on the axles, and having straight rails and ratchets on its upper surface.

When the lower carriage was at either end of the curved railway, its upper surface formed a direct continuation of one of the inclined planes; and being exactly one half of the length of the

curved railway, the uppermost point of the rails fixed on the carriage coincided exactly with the apex of the two inclines.

The principal carriage, with a boat on it, was then run forward so as to stand on the lower carriage, by a rope attached to a drum on the shaft of the fixed engine, and was held in its place by pawls dropping into the ratchets; when the lower carriage, with the travelling carriage and the boat on it, was moved forward by a wheel working in a rack under the lower carriage, which was thus made to traverse the apex or summit, and descended until the surface of the rails in the lower carriage, and on the incline, became identical; and the upper carriage was lowered into the water by the rope motion, and the boat was allowed to float from it into the next reach of the canal.

This plan was first proposed for removing vessels from a small dock by the side of the Vistula, at Warsaw, so as to be out of the reach of floods and of ice; and whenever there was a scarcity of water for lockage, or for working caisson inclined planes, it was admitted to be a desirable modification.

In the discussion, after paying a just tribute to the ingenuity and skill of the author, it was admitted that inclines of this nature were only applicable for certain exceptional situations; that in general it would be cheaper to pump up the water for lockage, and using it over again as might be required; and that in general the competition between railways and canals had ended in the partial abandoning of the latter, in spite of all attempts to use steam propulsion and traction.

INSTITUTION OF MECHANICAL ENGINEERS, BIRMINGHAM.

[*Continued from page* 52.]

The following paper by Mr. Robert Waddell, of Liverpool, was read:—

On an escape water-valve, and a governor for marine steam-engines.

The horizontal engine has of late years become a favorite engine in the British navy for screw steam ships, as it has the advantage of being better protected from shot than the vertical engine, by being placed under the water line together with the boilers. It is well known that all boilers are liable to prime more or less; but when they are confined in the height of steam room, as when applied to ships of war, they are more apt to prime and carry a considerable portion of water into the cylinders along with the steam.

Now, the object of the improved escape-valve, forming the subject of the present paper, is to draw the water off the cylinder throughout the stroke, and not allow it to accumulate, as with

the ordinary escape-valves, till the piston strikes the water. The author, in describing his invention, stated it to consist in the application of an escape water-valve attached at the lower side and to opposite ends of a horizontal steam cylinder. The water-valve consists of a small cylinder containing a float, the spindle of which carries, at opposite ends, two conical valves nearly in equilibrium. The top valve is made like a piston on the under side; so that when it leaves its seat it will prevent a great rush of steam from passing. It is also made slightly larger than the lower valve, so that the pressure of steam will assist in raising the valves; and a small accumulation of water about the float will open the valves: that is,—Suppose the float, valves, and spindle to weigh 50 lbs. for the largest-sized engine, and the pressure of steam in the boilers not to exceed 15 lbs. per square inch, and the top valve to be 3 inches more area than the bottom, then there will be 3 times 15=45 lbs. excess of pressure on the upper valve,—being within a few pounds of raising the valves, without any water about the float. The float should be made with sufficient buoyancy to raise the valves when there is no pressure of steam to assist.

When water enters the small cylinder from the steam cylinder the float is buoyed up, and the valves rising with it, the water is allowed to escape through the bottom of the small cylinder.

The top valve is made larger than the bottom one, to answer two purposes; namely, first, for the pressure of the steam to assist in raising them when a small quantity of water comes about the float; and, secondly, when a vacuum is formed in the cylinder the valves are kept shut, by the atmospheric pressure being greater on the top valve than on the bottom one: this will be the case if a great quantity of water enters the steam cylinder,—the valves will then be kept open,—running it off until the exhaust takes place.

The paper next proceeded to describe a marine engine governor checking the admission of steam when the engine runs away from the water; leaving the wheels or screw. The ordinary governor was said to have been tried for the purpose, but was found not to answer,—its action being too slow in shutting off and letting on steam: the pitching and rolling of the ship in a heavy sea was also very much against its action,—and from these defects it had been abandoned.

The ordinary method at present in use, when the engines are racing in a heavy sea, from the water leaving the wheels or the screw, is for the engineer either to close the throttle-valve to the required extent, to prevent the racing, or stand by the engines, with the throttle-valve handle in his hand, watching the motion of the engines, to shut off the steam when they run off, and let it on when the wheels take hold of the water. In a voyage across the Atlantic this has often to be done for several days and nights successively; because, closing the throttle-valve, and allowing the engines to go all the time throttled, when the wheels are in the water as well as out, diminishes the speed of the ship to a great extent. When the wheels leave the water, the steam that passes into the

cylinders is lost, as the engines have nothing to absorb their power,—besides the liability to break down the engines if they are allowed to race to any extent.

The governor described in the present paper can be used equally as well on land engines as on marine, where the work they are doing is not of a steady nature,—such as driving a rolling-mill or a saw-mill, &c. When the saws leave the log, or the iron leaves the rolls, the engine has nothing to absorb the power, and will run off before the ordinary governor will shut off sufficient steam,—its action being too slow for such sudden changes.

The proposed governor was described as applied to the steam-pipe so as to act upon the ordinary throttle-valve. It consists of a small cylinder fitted with a piston and rod, and bolted to the steam-pipe. The opposite ends of the cylinder are connected to the steam-pipe by two pipes, one above and the other below the throttle-valve. When the engine runs away, in consequence of the diminished resistance of the water, from the wheels or screw being out of the water, the pressure of the steam is also diminished by being wire-drawn by the throttle-valve; consequently, on the upper side of the piston there is the same pressure as in the boilers, and on the under side the diminished pressure due to the sudden expansion of the steam in flowing into the cylinders. The effect is to depress the piston in the small cylinder, and shut off the steam from the engines, by partially closing the throttle-valve; but when the pressure becomes equal, or nearly so, on both sides, the piston is raised, and the valve opened, by a spiral spring on the piston-rod. The lower end of this rod is provided with stops, which can be adjusted by set screws, so as to allow the throttle-valve to be opened and closed to the required amount.

It will thus be understood that when the throttle-valve is closed it will remain so, if time is not allowed for the space between the valve of the engine and the throttle-valve to get filled to the same pressure as above the valve, so that an equilibrium of pressure may take place on the piston, when the spring will open the valve. If the throttle-valve opens too soon, one of the stops must be altered, to allow the throttle-valve to close further, so that the space between the throttle-valve and the engine-valve will take longer to fill, and the reverse if it opens too soon.

The Chairman observed that the governor appeared capable of more general application, and suitable for iron works as well as marine engines.

Mr. Cowper thought the governor might prevent many accidents in iron works, from carelessness of enginemen leaving their engines, by checking the increase of speed in the case of a sudden diminution of load on the engine.

Mr. Benjamin Gibbons said that the proposed governor would certainly act very sensitively, and was an ingenious and simple contrivance.

The Chairman observed that the water-valve would be an improvement on the ordinary escape-valve, from its constantly

drawing off the water, and preventing any accumulation in the cylinder.

Mr. Gibbons thought the escape water-valve a good plan for horizontal cylinders, such as marine screw engines; but it was not suitable for vertical cylinders, which were mostly in use.

In answer to an enquiry from Mr. Cliff, Mr. Gibbons said there was no provision made for the escape of water in vertical cylinders, except flowing through the ordinary steam-ports along with the steam, at the top and bottom of the cylinder.

Mr. Ramsbottom said he had known much trouble to be caused with vertical cylinders by the accumulation of water, from the want of provision for carrying it off. The proposed escape-valve appeared likely to be advantageous in the case of horizontal cylinders, by preventing the accumulation of water; but in vertical cylinders it could only act fully at the lower end, as the water at the upper end could not be drained off except at the moment of the piston arriving at the top of its stroke.

Mr. Cowper thought there would be an objection to the application of the escape-valve, from air being drawn in a little at each stroke, because there must be some interval of time during the closing of the valve by the descent of the float; and although assisted by an excess of pressure downwards, from the top valve having a little larger area than the bottom one, the closing could not be instantaneous; and at every eduction stroke, air would be drawn in a little through the water at the bottom valve, as well as through the leakage of the upper valve.

The following paper, by Mr. John Ramsbottom, of Manchester, was next read:—

Description of an improved coking crane, for supplying locomotive engines.

This coking crane was designed by the writer about two years ago, in consequence of the great wear and tear of coke skips, used for coking engines, at the Manchester station of the London and North Western Railway, and the necessity that then more particularly existed for coking the engines in the least possible time, owing to the limited space there was then for the traffic. The crane consists essentially of a large wheel or circular rim, 20 feet in diameter, made of iron segments, having twenty arms, which may be considered the jibs of so many small cranes. These are mounted upon one common post or pillar, which revolves upon bearings at top and bottom; and each arm or jib is tied by a rod to a hollow cast-iron cone, which is fastened upon the top of the pillar, and is adjusted by means of a screw and nuts. In fact, the whole may be considered, so to speak, as twenty small cranes working from one common centre. Around the circumference of the rim are suspended, at equal distances, twenty wrought-iron cylindrical buckets, 2 feet 6 inches in diameter, and 2 feet 8 inches deep. Each bucket is fitted with a bow handle and swivels, so

as to be readily turned over when its load is to be discharged. The segments are also provided with teeth upon the lower edge, which gear into a pinion, and the movement is carried forward to a handle, by means of two pairs of bevil wheels, and in such proportion as to give 115 revolutions of the handle for one of the crane. The chief peculiarity, however, consists in the main post being fixed in an inclined position. This is done to such an extent as to throw one side of the rim 6 feet higher than the other; by which means, the buckets on one side are sufficiently low to be filled direct from the waggon, and on the other sufficiently high to deliver their loads upon the tender. The buckets hold in the aggregate three tons of coke; so that the crane will carry, ready for delivery at a moment's notice, sufficient coke to supply three passenger or two goods engines at least. Of course, when the crane is fully loaded, the whole is in equilibrium, and it can then be moved by a force sufficient to overcome the friction only: on the other hand, the greatest power is required when the buckets are empty on the descending side, and full on the other. The proportion given, however, will enable one man to work it under the worst circumstances.

In using this crane, the practice is to keep the buckets full, as far as circumstances will allow; and any engine requiring coke has the tender backed under the higher edge of the crane: the cokeman then turns the crane round by the handle, previously described, and continues to do so until the fireman or other person has turned over as many buckets of coke as are required. The time rarely exceeds two minutes for the delivery of 21 tons of coke, and is often less.

As respects the saving of labour, it may be mentioned that four men were formerly required to deliver coke at this station, and it is now delivered by two, and the skips are dispensed with.

There is one slight drawback to this machine, however; namely, that an engine cannot run past it, owing to the chimney; but where this is considered necessary, the crane may readily be fixed about 3 feet from the rails, and the coke be delivered by a moveable shoot.

The Chairman observed, that he had seen the coking crane described in the paper, and thought it a very simple and efficient plan. The one objection that had been named, of not leaving space for passing along the line by the side of the crane, might probably be remedied in several ways, if required in another situation.

Mr. Ramsbottom said that object had not been thought of at all in the present case, as it was the termination of the line, where it could not be extended beyond the crane, and that was the only one on the plan at present tried. The crane had been found very convenient, as it required very little power to work it, and held a large store of coke always ready for loading the tenders: it had been in constant work for more than two years, with scarcely any expense for repairs.

Mr. Cowper considered the crane well adapted for the purpose, and suggested that it might readily be made applicable to a situation where a clear passage was required on the line past the crane, by omitting a portion of the buckets on one side, perhaps one-third, which would always allow the passage of a train, when the blank side was turned towards the line. The same quantity of coke might be carried by increasing the size of the buckets or the diameter of the crane. He thought that a perfect coking crane should, if possible, be balanced in all positions, for the engineman to be able to pull it round by hand, and take in a supply of coke without requiring a second man to help; on the same principle as the present large 8-inch water-cranes, which supplied the water with great rapidity without help. This might be accomplished by working the crane round on a level, instead of inclined, so as to be always balanced, and lifting the coke up previously to the level by other means.

Mr. Woodhouse thought there would be a difficulty in raising the coke by other means; and the oblique crane, which he had frequently seen at work, was a very convenient mode of gradually raising the coke by the same movement as changing the buckets. In some places the coke was raised up at once from the waggons to a high platform, and then loaded into the tenders by a shoot; but that plan was not so convenient for measuring the coke as the crane with buckets holding exactly 3 cwt. each.

Mr. Ramsbottom observed, that the average height the coke had to be lifted in loading the tenders was only 3 feet, as the coke was already lifted an average of 3 feet, or half the total height of 6 feet, in the process of filling the buckets all round.

Mr. Cowper suggested that each bucket, when loaded on the platform, might be slung up or raised by a small windlass, and then hooked on to the crane at the upper level.

Mr. Ramsbottom observed, it would certainly store up more power ready for coking the tenders, if all the coke were previously lifted up to the full height, 6 feet, instead of an average of only half the height; but the simplicity of the machine would be somewhat interfered with.

Mr. Downing remarked that there might be room to pass the crane by fixing it a little farther from the line, and tipping the buckets over the side of the tender; there being no necessity, he supposed, to empty over the centre of the tender.

Mr. Lloyd suggested an octagon form for the purpose instead of a circle: he thought the same plan of crane would suit well for filling blast furnaces, where, as in Wales, there was not more than 6 feet to lift the materials in many cases.

Mr. Gibbons thought the plan might be very applicable in several parts of iron works, such as raising small coal and rubbish, and removing the cinder from the furnaces: he thought it a very good contrivance, involving the least possible expenditure of labor, where a large quantity of material was required to be lifted a small height.

PROVISIONAL PROTECTIONS GRANTED.

[*Case in which a full Specification has been deposited.*]

3032. Chretien Guillaume Schönherr, of Chemnitz, Saxony, for improvements in bobbin machines.—[*Dated December* 31*st.*]

[*Cases in which a Provisional Specification has been deposited.*]

1900. John Gwynne, of Essex-wharf, Strand, for improvements in the preparation of a black powder from coal, and the application thereof to the manufacture of paints, blacking, and various other purposes.—[*Dated August* 13*th.*]

2004. John Henry Johnson, of Lincoln's-inn-fields, for improvements in the preparation and application of gluten,—being a communication.—[*Dated August* 29*th.*]

2404. Emory Rider, of Coleman-street, for improvements in the manufacture or treatment of gutta-percha; being improvements upon the invention secured to him by letters patent, dated the 20th day of July, 1852,—being partly a communication.—[*Dated October* 18*th.*]

2456. Christopher Richard Norris Palmer, of Amwell, for an improved mode and apparatus for preventing accidents on railways, including improvements in signalizing apparatus.

2462. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved construction of railroad carriage axle,—being a communication.—[*Dated October* 25*th.*]

2576. James Barlow, of Bolton-le-Moors, and Thomas Settle, of the same place, for certain improvements in power looms for weaving.—[*Dated November* 5*th.*]

2667. William Underwood, of Handsworth, for improvements in cooking stoves.—[*Dated November* 17*th.*]

2701. Aaron Parfitt, of Newbury, Berks, for improvements in the construction of certain descriptions of vehicles.—[*Dated November* 21*st.*]

2712. Robert Adams, of King William-street, for improvements in fire-arms.—[*Dated November* 22*nd.*]

2741. Alexandre André Victor Sarrazin de Montferrier, of Paris, for improvements in wheels for vehicles on common roads and railways.—[*Dated November* 25*th.*]

2771. John Carter Ramsden, of Bradford, Yorkshire, for improvements in apparatus or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.—[*Dated November* 28*th.*]

2776. Edward Joseph Hughes, of Manchester, for an improved method of purifying and concentrating the colouring matter of madder, munjeet, spent madder, or any preparations thereof, however they may be made.—[*Dated November* 29*th.*]

2832. George Ross and James Inglis, of Arbroath, N. B., for improvements in looms.—[*Dated December* 6*th.*]

2847. Thomas Morau, of Dublin, for an improved means or apparatus for the prevention of accidents on railways in certain cases.—[*Dated December* 8*th.*]

2858. Jean Baptiste Edouard Rüttre, of Paris, for improvements in machines for producing shoddy from woven fabrics, and for sorting the fibres of fibrous materials.

2859. Pierre Marie Fouque, Louis Réné Hébert, and Vincent Etienne Doret le Marneur, all of Paris, for improvements in rudders.

2868. John Chisholm, of Holloway, for improvements in the distillation of organic substances and in obtaining products therefrom.

The above bear date December 9*th.*

2879. Hippolyte Laurent Du Bost, of Rue Neuve des Petits Champs, à Paris, for improvements in the construction of locks and keys. —[*Dated December* 10*th.*]

2895. Philip Grant, of Manchester, for improvements in printing presses.

2897. John Ambrose Coffey, of Providence-row, Finsbury, for an improved method of evaporating liquids.

2899. John Zuill Kay, of Dundee, for improvements in gas-meters.

2901. John Wibberley, of Eagley, near Bolton, for certain improvements in machinery or apparatus for winding yarns or threads on to spools or bobbins.

2903. Robert Parrock, of Glasgow, for improvements in coats and similar articles of dress.

The above bear date December 14*th.*

2905. Eugéne Hippolyte Rascol, of Catherine-street, Strand, for improvements in retorts for the manufacture of gas,—being a communication.

2906. Samuel Messenger, of Birmingham, for an improvement or improvements in railway, ship, and carriage lamps.

2907. Thomas Pugh and William Kennard, both of King-street, Snow-hill, for improvements in lock and latch spindles.

2908. Joseph Bennett Howell and John Shortridge, both of Sheffield, for an improvement or improvements in the helves of tilt hammers.

2909. Jacques Pierre Henri Vivien, of Paris, for certain improvements in the manufacture of paper and pasteboard.

2910. Auguste Edouard Loradoux Bellford, of Castle-street, for an improvement in blasting powder for mining and other operatioes of a similar nature,—being a communication.

2912. Juan Baptiste Pascal, of Lyons, for certain improvements in obtaining motive power.

2913. Frederick William Branston, of Oak Tree House, Clapham, for improvements in certain tablets, labels, and signs, or their surfaces exhibiting letters and designs.

2914. Charles John Morris, of Kirby-street, Hatton Garden, for certain improvements in book-binding.

2915. Benjamin Whitaker, of Brighton, for improvements in the manufacture or production of useful toys.

2916. Alexander Cochran, of Kirkton Bleach Works, Renfrew, for improvements in the application of starch or other substances of a similar nature to woven fabrics, and in the machinery or apparatus employed therein.

2917. Ferdinand Denis Gibory, of Paris, for improvements in instruments for ascertaining heights and distances, and for levelling.

2918. Arthur Benjamin Samuel Redford, of Albion-place, Walworth-road, and Thomas Cleake, of Saville-row, Walworth-road, for improvements in retarding and stopping the progress of railway carriages.

The above bear date December 15th.

2919. William Binnion, of Birmingham, for improvements in carriage and other lamps.

2920. Walter George Whitehead, of Birmingham, for an improvement or improvements in hats, caps, bonnets, and other coverings for the head.

2921. William Tranter, of Birmingham, for certain improvements in fire-arms, and in bullets and waddings to be used therewith.

2922. Antoine Limousin, of Paris, for improvements in looms for weaving pile fabrics, and in a mode and apparatus for cutting the pile.

2923. Alphonse Médail, of Paris, for an improved hydraulic machine.

2924. Thomas Williams, of South Castle-street, Liverpool, for an improved revolving pistol.

2925. Thomas Seaville Truss, of Cannon-street, for improvements in brakes for railway carriages and other vehicles.

2926. Thomas Seaville Truss, of Cannon-street, for improvements in apparatus for communicating between the engine driver and the guard of railway trains.

2927. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in dyeing,—being a communication.

2928. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in the treatment or preparation of wool, and of the wash-waters employed in such treatment,—being a communication.

2929. Stephen Norris, of New Peter-street, Horseferry-road, for improvements in lighting and extinguishing gas lamps.

2930. Samuel Smith, of Horton Dye Works, near Bradford, Yorkshire, for improvements in preparing rovings and yarns of wool.

2931. Alexander Parkes, of Birmingham, for improvements in separating silver from its ores or other compounds.

2932. Robert Burt Hall, of Whitecross-street, for improvements in crushing and grinding quartz, minerals, and other matters.

2934. Andrew Lawson Knox, of Glasgow, for improvements in ornamenting certain descriptions of textile fabrics.
2935. Henry Thomson, of Clitheroe, for improvements in machinery or apparatus for stretching textile fabrics as they are wound into laps or rolls after the processes of bleaching and dyeing, or operations connected therewith.
2936. Robert William Waithman, of Bentham House, Yorkshire, for improvements in belts or bands for driving machinery for use in mines, and for other purposes.

The above bear date December 16th.

2937. Joseph Sharp Bailey, of Keighley, for improvements in machinery for operating upon wool, alpaca, mohair, and other fibrous materials, preparatory and prior to being spun.
2938. Joshua Horton, of Birmingham, for improvements in the manufacture of certain kinds of metallic vessels.
2939. George Anderson, of the Gas Works, Rotherhithe, for improvements in apparatus used when manufacturing gas; which apparatus, or part of which, is also applicable when transmitting gas from one place to another.
2940. Caleb Bedells, of Leicester, for improvements in the manufacture of elastic fabrics.
2941. John Davie Morries Stirling, of the Larches, near Birmingham, for improvements in the manufacture of iron.
2942. John Greenwood, of Arthur-street West, for improvements in preventing drafts of air into rooms and places when the doors and windows are shut.
2943. Isaac James, of Cheltenham, for improvements in carts for distributing water or liquid manure.
2944. Matthew Parsons Houghton, and Andrew Stewart, both of Hilmorton, for an improved means of preventing accidents upon railways.
2946. Robert Whewell, of Little Bolton, for improvements in machines used for cutting paper.

The above bear date December 17th.

2947. Henry Milward, of Redditch, for new or improved machinery for manufacturing needles and fish-hooks,—being a communication.
2948. John Tribelhorn, of St. Gall, and Dr. Pompejus Bolley, of Aarau, both of Switzerland, for improvements in the process of bleaching vegetable fibrous substances,—being a communication.
2949. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in paddle-wheels for propelling vessels,—being a communication.
2950. William Crossby, of Devonshire-street, Sheffield, for the ventilation of granaries, store houses, or places of deposit for grain whatsoever, and for improvements in the grinding of grain and dressing of grist, and grinding generally.

2951. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in presses for expressing oil or other fluids from fruits, grains, or other substances,—being a communication.

2952. Richard Waygood, of Newington-causeway, for improvements in portable forges.

2953. David Goldthorp, of Cleckheaton, near Leeds, for an improved propeller.

The above bear date Deeember 19th.

2954. Adam Paterson, of Westminster, for an improved cooking apparatus.

2955. James Hunter Campbell, of King's-Arms-yard, for an improvement in machinery for cutting corks.

2956. Josiah Latimer Clark, of Chester Villas, Canonbury Park, for an improvement in insulating wire used for electric telegraphs, with a view to obviate the effects of return or inductive currents.

2957. Henriette Elisa Farion de Gergy Veuve Durut, of Paris, for certain improvements in the manufacture of bread.

2958. Paul Wagenmann, of Bonn, for improvements in the manufacture of liquid hydro-carbons and parafine.

2959. James Boydell, of Gloucester-crescent, for improvements in the manufacture of wrought-iron frames.

2960. Emile Victor Felix Lemaire, of Rue Drouot, Paris, for improvements iu tanning.

2961. John Webster, of Cornwall-road, Stamford-street, for improvements in acting on drying oils and preparing varnishes.

2962. James Burrows, of Haigh Foundry, near Wigan, for certain improvements in the formation of such metallic plates as are required to be conjoined by rivetting or other similar fastening.

2963. James Burrows, of Haigh Foundry, near Wigan, for certain improvements in the construction of steam-boilers or generators, and in the arrangement of furnaces connected therewith.

2965. R. B. Huygens, of Holland, for improvements in machinery for crushing, washing, and amalgamating gold and other ores and substances.

The above bear date December 20th.

2966. Gottlieb Boccius, of Hammersmith, for certain apparatus adapted to the breeding and rearing of fish.

2967. Charles James Farrington, of Hampstead, for improvements in signalling and preventing collisions on railways by electrical communication.

2968. Heiman Kohnstamm, of Union-court, Old Broad-street, for certain improvements in the manufacture of imitation leather.

2969. Thomas Vincent Lee, of Lockyer-terrace, Plymouth, for improvements in the construction of certain machinery and apparatus for the manufacture of bricks and tiles.

2970. James Dinning and William Inglis, both of Southampton, for an improved apparatus for purifying and filtering residuous water.

2972. John Jones, of Glasgow, for improvements in governors or regulators for steam-engines and other machinery.

The above bear date December 21st.

2973. John Youil, of Burton-upon-Trent, for improvements in the mode or method of obtaining power to raise liquids, and of treating the said liquids when raised, and of using them to obtain additional power.

2974. Louis Adolphe Ferdinand Besnard, of Paris, for a new system of painting, by means of lithography, without leaving a particle of paper upon the canvas.

2975. Peter Armand Le Comte de Fontainemoreau, of South-street, for certain improvements in constructing and applying connecting-rods,—being a communication.

2976. William Henry Woodhouse, of Parliament-street, for improvements in the construction of roads, ways, and ducts.

2977. Charles Lewis, of Hull, for an improved lamp for signalling.

2978. Benjamin Murgatroyd, of Bradford, Yorkshire, for improvements in washing or scouring wool, alpaca, and mohair, and fabrics composed entirely or partly of those materials.

2979. Thomas Berry, of Rochdale; James Mangnall, of Heywood; and John Chadwick, of Heywood aforesaid, for improvements in winding and twisting wool, cotton, and other fibrous materials.

2980. James Gibbons, the younger, of Wolverhampton, for improvements in locks and latches.

2981. Joseph Shaw, of Hatton-garden, for improvements in piano-fortes,—being a communication.

The above bear date December 22nd.

2982. John Gillow, jun., of Northwich, for certain improvements in the manufacture of salt.

2983. John Britten, of Birmingham, for improvements in girders, bridges, roofs, and other such like structures.

2984. John O'Neil, of Bury, for an improvement in apparatus for drawing condensed steam and air from pipes, or other chambers, in which steam is used.

2985. Francis Bennoch, of Wood-street, Cheapside, for improvements in coating silk and other yarn or thread with gold or other metal,—being a communication.

2986. Jean Daniel Pfeiffer, of Paris, for improvements in machinery or apparatus for cutting paper and similar materials.

The above bear date December 23rd.

2987. Richard George Coles, of Cheltenham, for improvements in the locks of fire-arms.

2988. Joseph Gaultier, of Paris, for an improved apparatus for washing and bleaching.
2989. George Goutaret, of Paris, for a new system of propulsion.
2990. Joshua Margerison, of Preston, for improvements in railway brakes.
2991. Harris Hardinge, of New York, for manufacturing liquid quartz or silex, to be used in the manufacture of certain compositions for ornamental and useful purposes.
2992. Gustav Adolph Buchholz, of Gould-square, Crutched-friars, for improved machinery for the cleaning and hulling or dressing of rice, wheat, and other grain.
2993. Joseph Lewis, of Salford, for improvements in apparatus for drilling or boring metals and other substances.
2994. Thomas Cooper, of Leeds, for an improvement applicable to the binding of ledgers and other books.

The above bear date December 24th.

2995. Thomas Williams Makin, of Manchester, for improvements in machinery or apparatus for finishing woven fabrics.
2997. Frederick Crace Calvert, of Manchester, for improvements in the treatment of naphthas and other volatile hydrocarbons, and in the application of the same to various useful purposes,—being a communication.
2998. George Josiah Mackelcan, of Letchlade, for improvements in winnowing or corn dressing machines.
2999. Samuel Sedgwick and Thomas Dawson, of Piccadilly, for improvements in the moderator lamp, or in lamps of a similar principle.
3000. Thomas Symes Prideaux, of St. John's Wood, for improvements in apparatus for regulating the supply of air to furnaces, and for preventing radiation of heat from fire-doors and other parts of the fronts of furnaces.
3001. Thomas Molyneaux, of Manchester, for certain improvements in winding and doubling silk; a part of which improvements is applicable to the treatment of other fibrous substances.

The above bear date December 27th.

3002. John Parkinson, of Bury, for improvements in governors for regulating the pressure of steam, gas, and other fluids or liquids.
3003. John Moffat, of Heiton, Roxburgh, for improvements in the means of communicating between the guard and the engine-driver in a railway train.
3004. James Taylor, of the Britannia Works, Birkenhead, for certain improvements in raising and lowering weights.
3005. William Unett Coates, of Ombersley, for a new or improved rotary steam-engine.
3006. Joseph Alexis, of Avignon, for an improved railway brake.
3007. Richard Green, of the Flint Glass Works, Brettell-lane, Staffordshire, for improvements in insulators for insulating the

wires or rods employed for conducting or transmitting electricity.

3008. John Macintosh, of Pall Mall East, for an improvement in discharging projectiles.

3009. John Barnes, of Church, Lancashire, for a certain improvement or improvements in dyeing and cleansing cotton, silk, wool, and other fabrics.

3010. Francis Parker, of Northampton, for an improvement in the manufacture of gaiters.

3012. Duncan M'Nee, of Hillfield, Kirkintillock, and Alexander Broadfoot, of Ingram-street, Glasgow, for improvements in printing with colors on cloth; which are also applicable to printing ornamental designs on paper or other surfaces.

3013. Thomas Phillips, jun., of Sparkbrook, and Samuel Phillips, of Birmingham, for improvements in the construction of window shutters, which improvements are also applicable as an additional security for doors and other similar openings.

The above bear date December 28th.

3014. Henry Jackson, of High-street, Poplar, for improvements in machinery for moulding bricks and other articles of brick-earth.

3015. Edward Estivant, of Givet, France, for improvements in the manufacture of tubes of copper and its alloys.

3016. Mary Phillips, of Birmingham, for an improvement or improvements in metallic revolving or winding shutters,—being a communication from her late husband.

3017. Amédée François Rémond, of Birmingham, for new or improved metallic tubes.

3018. James White, of East-street, Red Lion-square, for improvements in friction joints or fastenings.

3020. Claude Alphonse Roux, of Belleville, near Paris, for improvements in printing warps of cut pile and similar fabrics.

3021. Hippolyte Charles Vion, of Paris, for improvements in pistons and stuffing boxes of engines moved by water, steam, or gas.

3022. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in the manufacture of screws,—being a communication.

The above bear date December 29th.

3025. Benjamin Swire, of Ashton-under-Lyne, for improvements in machinery or apparatus for making metal tips for shoes and clogs.

3026. Henri Catherine Camille de Ruolz and Anselme de Fontenay, both of Paris, for an improved metallic alloy.

3027. James Marlor, of Oldham, for certain improvements in ascending and decending mines and shafts, and in the apparatus connected therewith; by which said improvements the ventilation of mines is increased.

3028. Walter Mabon, of Ardwick Iron Works, Manchester, for improvements in machines used for rivetting together metallic plates.

The above bear date December 30th.

3029. Isaac Holroyd, of Sowerby-bridge, Yorkshire, for improvements in apparatus employed in singeing textile fabrics.

3030. John Milner, of Stratford, Essex, for improvements in connecting the rails of railways.

3031. Henry Vernon Physick, of North Bank, Regent's-park, for improvements in electric telegraphs and apparatus connected therewith.

3033. John Pym, of Pimlico, for improvements in machinery for grinding auriferous and other ores, and separating the metal therefrom.

3034. Weston Tuxford, of Boston, Lincolnshire, for improvements in portable thrashing machines; part of which improvements is also applicable to fixed thrashing machines.

3035. Alfred Trueman, of Swansea, and Isham Baggs, of London, for improvements in grinding, amalgamating, and washing quartz and other matters containing gold.

3036. Richard Waygood, of Newington Causeway, for improvements in portable forges.

3037. Joseph Holbrey, of Bradford, Yorkshire, for improved machinery for combing wool and other fibrous materials.

3038. James Slater, of Salford, for certain improvements in cocks, taps, or valves.

3040. Thomas Brown, and Peter McGregor, both of Manchester, for certain improvements in power-looms for weaving.

3041. Adolphus Oppenheimer, of Manchester, for certain improvements in the manufacture of silk velvet and other such piled goods or fabrics.

3042. Benjamin Hunt, of Brighton, for improvements in obtaining and applying motive power.

3043. Pierre Sonntag, of Paris, for an improved apparatus for measuring and fitting garments of persons.

3044. François Aristide Clerville, of Paris, for an improvement in the construction of fire-arms.

3045. Stanislas Tranquile Modeste Sorel, of Paris, for certain improved compositions to be employed as substitutes for caoutchouc, gutta-percha, and certain fatty bodies.

The above bear date December 31st.

1854.

1. Charles Hustings Collette, of Lincoln's-inn-fields, for improvements in the manufacture of sugar,—being a communication.

2. Edwin Dalton Smith, of Hertford-street, May Fair, for a mode of communication between the passengers, guards, and engineer of a railway train.

3. Alfred Dawson, of Barnes-place, Mile-End-road, for converting small coal or coal-dust, or small coal and coke, into solid blocks of fuel.
4. James Gowans, of Edinburgh, for improvements in apparatus for heating and ventilating, and in baths and washing apparatus connected therewith, applicable to dwelling-houses.
5. Pierre Ambroise Montel, of Paris, for certain improvements in stopping the trains on railways.
6. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in dyeing wool,—being a communication.
7. Peter Armand Le Comte de Fontainemoreau, of South-street, for certain improvements in water-wheels,—being a communication.

The above bear date January 2nd.

8. Henry Lee Corlett, of Dublin, for improvements in caoutchouc springs for locomotive engines and tenders, railway carriages and waggons.
9. Joseph Madeley, of Walsall, for an improvement or improvements in the manufacture of certain kinds of tubes, and in nuts for, and heads of screws.
10. David Kennedy, of Reading, Pennsylvania, U.S., for an invention for the use of tanners; being certain compositions of matter to be used in the manufacture of leather.
11. James Stovold, of Barnes, Surrey, for improvements in machinery or apparatus for sifting and washing gravel or other similar substances.
12. Felix Alexandre Testud de Beauregard, of Paris, for improvements in drying cigars and ligneous materials or other substances.
13. Edward John Willson, of Oxford-street, for an improved method of making portfolios, music books, brief cases, and pocket books.
14. John Collins, of Liverpool, for improvements in the manufacture of vinegar.
15. John Isaiah Grylls, of Murton-street, Sunderland, for an improvement in whelps for the barrels of capstans, windlasses, and other machinery.
16. Thomas Mann, of Horsham, for an improved cinder-sifting shovel.
18. John Dransfield, of Oldham, and William Robinson, of the same place, for certain improvements in carding engines for carding cotton, wool, and other fibrous substances.

The above bear date January 3rd.

19. David Hulett, of High Holborn, for improvements in gas regulators for regulating the supply of gas to the burner,—being partly a communication.

20. John Taylor, Miles Wrigley, and Samuel Greaves, all of Oldham, for certain improvements in carding-engines for carding cotton, wool, and other fibrous substances.

The above bear date January 4th.

21. Joseph Liddiard, of Deptford, for improvements in the construction of furnaces, with a view to the prevention of smoke.
22. Edward Schischkar, of Halifax, Yorkshire, and Frederick Crace Calvert, of Manchester, for improvements in dyeing and printing textile fabrics and yarns.
23. David Blair White, of Newcastle-upon-Tyne, for improvements in the manufacture of waterproof fabrics, and of waterproof bags, and other like articles.
24. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in ventilating carriages and buildings; part or parts of such improvements being applicable to the obtainment of motive power,—being a communication.
25. William Rigby, of Glasgow, for improvements in steam-hammers and pile-driving machinery.
26. Léon Joseph Pomme, of Paris, for certain improvements in reducing the friction of axles and axle-trees of carriages.
28. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improved machinery for crushing or grinding and washing and amalgamating quartz, rock, and other substances, —being a communication.

The above bear date January 5th.

29. Isaac Pearse, of Cawsand, Cornwall, for improvements in means for navigating ships or other vessels.
30. Henry Hind Edwards, of Ludgate-hill, for certain improvements in treating peat and vegetable matters for the purpose of fuel, as well as in the extraction of other useful products therefrom,—being partly a communication.
31. Robert Tait, of Glasgow, for improvements in the manufacture or production of ornamental fabrics.
32. John Radcliffe, of Stockport, for certain improvements in power looms for weaving.
33. John Healey, of Bolton-le-Moors, for improvements in spinning machines (known as mules) and in machines of a similar character,—being a communication.
34. Moses Poole, of Avenue-road, Regent's Park, for improvements in the manufacture of dextrine, glucose, and alcohol, and in employing the products of such manufacture,—being a communication.
35. John Davie Morries Stirling, of the Larches, near Birmingham, for improvements in the manufacture of iron.
36. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in the construction of motive power

engines; part of which improvements is also applicable to the packing of pistons generally,—being a communication.

The above bear date January 6th.

38. William Edward Newton, of the Office for Patents, Chancery-lane, for improved machinery for dyeing, washing, and bleaching fabrics,—being a communication.

42. Nicholas Michael Caralli, of Glasgow, for improvements in the manufacture or production of ornamental fabrics.

44. Henry Sutherland Edwards, of Paris, for improvements in preparing textile fabrics or materials for the purpose of their better retaining colors applied to them,—being a communication.

The above bear date January 7th.

46. Zachariah Pettitt, of Fordham, near Colchester, for improvements in thrashing machines.

48. Richard Husband, of Manchester, for certain improvements in the method of ventilating hats or other coverings for the head.

50. Richard Howson, of Manchester, for certain improvements in screw propellers.

The above bear date January 9th.

52. Edward Tyer, of Rhodes-terrace, Queen's-road, Dalston, for improvements in giving signals on railways by electricity, and in instruments and apparatus connected therewith.

54. Antoine Marie Edouard Boyer, Elie Ducros, and Ossian Verdeau, all of Paris, for certain improved compounds to be used in dyeing.

56. The Reverend William Renwick Bowditch, of Wakefield, Yorkshire, for improvements in the purification of gas, and in the application of the materials employed therein.

58. Alexander Mitchell, of Belfast, for improvements in propelling vessels.

60. Adolphe Drevelle, of Halifax, Yorkshire, for a new combing machine, suitable for any textile or fibrous matter,—being a communication.

The above bear date January 10th.

62. Ambroise Auguste Masson, of Paris, for improvements in the manufacture of thread or wire to be used for making gold or silver lace.

66. William Watt, of Glasgow, for certain improvements in the application of heat to drying purposes.

68. Richard Archibald Brooman, of Fleet-street, for improvements in extracting gold from the ore,—being a communication.

70. Marcel Vetillart, of Le Mans, France, for improvements in drying woven fabrics, yarns, and other goods.

72. Felix Tussaud, of Paris, for an universal pump-press, with continuous action, called "continuous producer."

The above bear date January 11th.

List of Patents

Granted for SCOTLAND, from the 22nd December, 1853, *to the 22nd January,* 1854.

To Stephen Taylor, of New York, United States of America, for certain improvements in the construction of fire-arms, and in cartridges for charging the same.—Sealed 30th December, 1853.

Pierre Amable de Saint Sicard, of Paris, chemist, for improvements in enabling persons to remain under water and in noxious vapours.—Sealed 13th January, 1854.

New Patents.

Sealed under Old Law.

To Bennet Woodcroft, formerly of Mumps, in the township of Oldham, in the county of Lancaster, but now of Furnival's Inn, in the City of London, Gent., for an extension, for the term of seven years from the 4th January, 1852, of letters patent, granted to him, and bearing date 4th January, 1838, for improvements in the construction of looms for weaving various sorts of cloth; which looms may be set in motion by any adequate power.—[*Dated* 26*th July,* 1853.]

Sealed under Patent Law Amendment Act, 1853.

1464. Jules A. A. Dumoulin.
1559. Carlo Minasi.
1561. Auguste E. L. Bellford.
1562. Auguste E. L. Bellford.
1564. Thomas Edward Irons.
1574. Elias R. Handcock.
1575. Auguste E. L. Bellford.
1581. William C. Spooner.
1582. William Tasker.
1584. Phillip Hart.
1588. John and William Rollinson.
1590. Lemuel Wellman Wright.
1592. R. A. Brooman.
1598. Henry Meyer.
1599. Marcus Davis.
1600. Decimus J. Tripe.
1607. Thomas Newey.
1608. Peter Erard.
1609. P. A. Le Comte de Fontainemoreau.
1610. John and William Hood.
1614. James Bradshaw and Thomas Dawson.
1616. John Woodward.
1621. Alexander A. Croll.
1628. William Robertson.
1633. Philippe Poirier de St. Charles.
1636. Ewald Riepe.
1637. Ewald Riepe.
1641. Pierre A. Tournière and Louis N. De Meckenheim.
1645. George Ager.
1650. George Dalton.
1651. Felix Lieven Bauwens.
1652. J. B. Finnemore.
1653. William Levesley.
1658. James Fletcher.
1661. Henry Montague Grover.
1663. Thomas Hill Bakewell.
1667. Arnold Morton.
1672. William Henderson.
1675. George Humphery.

1679. Benjamin Looker, jun.
1682. Robert Gordon.
1683. H. J D'Huart.
1696. Jean Baptiste Jelie.
1699. Henry Lamplough.
1705. John Wallace Duncan.
1706. Isaie Alexandre.
1707. Wm. Boggett and Wm. Smith.
1710. Samuel Perkes.
1711. Donald Brims.
1712. P. A. Le Comte de Fontainemoreau.
1714. Charles Breese.
1717. Edwin D. Smith.
1723. John Lilley.
1724. William Birkett.
1725. Simon Charles Mayer.
1728. E., H., and F C. Cockey.
1729. James Murdoch.
1732. John Gillam.
1736. William Huntley.
1739. John Hall.
1741. S. Barlow and J. Pendlebury.
1744. Alexander Clark.
1745. William Ireland.
1757. Thos. Banks & Henry Banks.
1758. Thomas Buxton.
1767. A. L. Du Temple de Beaujeu.
1769. Charles Cummins.
1778. William Wild.
1785. P. A. Le Comte de Fontainemoreau.
1793. John Shae Perring.
1794. Samuel C. Lister.
1806. P. A. Le Comte de Fontainemoreau.
1808. Matthias E. Boura.
1822. George Armitage.
1825. Thomas Moss.
1846. R. Christy and J Knowles.
1851. Thomas Y. Hall.
1862. Thomas Mc Sweny.
1863. Samuel Hall.
1894. Robert S. Bartleet.
1898. G. Peel and R. Brownhill.
1899. Chandos W Hoskyns.
1903. J. H. Johnson.
1914. E. Finch and C. Lamport.
1919. William Hunt.
1949. Alexander Cuninghame.
1961. William Rettie.
1963. John Whiteley.
1967. B. H. Hine, A. J. Mundella, and T. Thompson.
1982. Eugene de Varroc.
1989. James Hill.
1993. Samuel Taylor.
1995. George Robinson.
2006. Charles Goodyear.
2025. R. A. Brooman.
2042. John Clare, jun.
2065. Robert Harrington.
2111. L. A. Brocot.
2171. Charles Collins.
2206. Charles E. Austin.
2218. R. Brisco and P. S. Horsman.
2219. Moses Poole.
2225. William E. Newton.
2229. John Phillips.
2234. Hiram Berdan.
2236. James Willis.
2239. R. Brisco and P. S. Horsman.
2242. Charles Coates.
2249. Isaac Ambler.
2251. R. Halliwell and W. Johnson.
2254. John W Baxter
2258. William H. Wilding.
2261. Peter R. Jackson.
2262. William Peace.
2263. Henry J. Jordan.
2264. John Norton.
2269. William Gossage
2272. Alexander Turiff.
2287. Henry Goddard.
2288. William Geeves.
2289. John Rubery.
2295. John H. Johnson.
2301. F. Whitehead and W. Whitehead.
2305. Joseph Denton.
2310. H. R. Plimpton and J. L. Plimpton.
2311. C. May and J. Samuel.
2312. Henry Clayton.
2313. William E. Newton.
2316. George F. Wilson.
2318. George F. Wilson.
2319. F. Warner and J Shotton.
2322. James Knowles.
2326. W Beardmore and W. Rigby.
2328. J. C. Sharp.
2331. J. H. Nalder & J. T. Knapp.
2334. William H. Muntz.
2335. James Webster.
2337. Bernard Cowvan.
2340. Nicolas Callan.
2341. P Clark and A. Clark.
2348. Charles S. Jackson.
2350. Charles S. Jackson.
2351. R. Jones and C. J Jones.
2352. Henry W. Butterworth.
2354. R. Popple and H. Woodhead.
2355. John Elce.
2356. William Robinson.
2358. John T. Way.
2359. Abraham Pope.
2361. Charles L. A. Meinig.
2362. Thomas Grahame.
2370. William E. Newton.
2375. Charles Coates.

2377. Benjamin Price.
2386. George Laurie.
2387. Augustus Applegath.
2388. George Frederick Chantrell.
2392. Capper Pass.
2393. Ellen Jones.
2394. Samuel C. Lister.
2396. Augustus Applegath.
2400. C. P. D'Azene.
2412. George Collier.
2414. Charles Barraclough.
2417. Thomas Thompson.
2421. William Russell.
2423. John France.
2426. Julius A. Roth.
2429. John H. Johnson.
2432. J. G. Marshall and P. Fairbairn
2433. James Warburton.
2437. Samuel Lloyd, jun.
2438 J. Greenbank & S. Pilkington.
2440. Frederick A. Gatty.
[illegible] John Baily.
2447. John H. Johnson.
2450. James D. Young.
2455. Thomas Summerfield.
2458. Jno. Fordred and Thos. Boyle.
2460. A. Curtis and B. Donkyn, jun.
2466. Charles Goodyear.
2469. Edward Austin.
2475. Downes Edwards.
2476. Patrick B. O'Neill.
2471. R. Heyworth & T Battersby.
2480. Thos. Dunn and Wm. Gough.
2496. Aristide M. Servan.
2497. John Johnson.
2506 William Betts.
2508. Joseph Haley.
2515. Anthony P. Conbrough.
2526. John and Thomas Whitehead.
2530. Joseph Bauer
[illegible] Edward Ward.
2544. James Howard.
2545. Richard E Hodges.
2546. Charles Iles.
2549. John Moffat.
2551. Thomas Irving.
2552. Bryan E. Duppa.
2557. Joseph H. Tuck.
2561. William G. Ginty.
2575. John Rubery.
2579. H. Pershouse and T. Morris.
2587. Alfred V. Newton.
2590. E. H. Graham.
2591. Humphrey Chamberlain.
2597. T. Dunn, J. Bowman, and J. Dunn.
2601. James Atkins.
2603. William Rodger.
2605. Samuel M. Folsom.
2609. A. A. V S. de Montferrier.
2613. Richard Dryburgh.
2621. J. M. Levieu.
2622. Stephen Barker.
2628. Thomas De la Rue.
2632. William Hadfield.
2635. Alexander Cunninghame.
2636. Matthew Gray.
2644. John Liddell.
2645. Jno. Cameron and Jas. Napier.
2646. J. H. B. Thwaites and W. B. Herapath.
2648. Joseph Fry.
2653. Phillip Hill.
2654. John Ronald.
2662. John Clare, jun.
2668. Charles Burton.
2679. William Taylor.
2680. James Melville.
2682. Moses Poole.
2685. Henry R. Cottam.
2687. R. S. Norris and E. Talbott.
2694. J. G. Potter and R. Mills.
2711. Alfred Bird.
2714. F. Levick and J. Fieldhouse.
2717. William Pegg.
2718. Francis Arding.
2722. John F. Empson.
2730. Thomas William Kinder.
2738. Elmer Townsend.
2740. Daniel L. Banks.
2742. Davidson Nichol.
2747. J. H. Johnson.
2808. George Collier.
2810. Samuel C. Lister.
2812. Jonathan Saunders.
2819. Charles William Hockaday.
2830. John Mold.
2838. John Hargrave.

*** *For the full titles of these Patents, the reader is referred to the corresponding numbers in the List of Grants of Provisional Protections.*

CELESTIAL PHENOMENA FOR FEBRUARY, 1854.

D.	H.	M.	
1			Clock before the ☉ 13m. 55s.
	—		☽ rises 9h. 48m. M.
	—		☽ passes mer. 3h. 27m. A.
	—		☽ sets 9h. 40m. A.
	12	42	♃ in the descending node
3	6	32	♃'s first sat. will im.
	19	13	♅ in conj. with the ☽ diff. of dec. 2. 15. N.
4	10	37	☽ in □ or first quarter
	18	56	♀ stationary
5			SATURN occul. im. 4h.13m. em. 4h. 34m.
5			Clock before the ☉ 14m. 20s.
	—		☽ rises 10h. 51m. M.
	—		☽ pass mer. 6h. 33m. A.
	—		☽ sets 1h. 19m. M.
	5	16	♄ in conj. with the ☽ diff. of dec. 0. 53. S.
7			Occul. 121 Tauri, im. 13h. 8m. em. 14h. 10m.
	6	20	☿ greatest Hel. Lat. S.
	13	0	☽ in Apogee
8	2	23	☿ in sup. conj. with the ☉
9			Occul. 52 Geminorum, im. 9h. 23m. em. 10h. 36m.
	9	0	♀ in Perihelion
10			Clock before the ☉ 14m. 33s.
	—		☽ rises 1h. 59m. A.
	—		☽ pass mer. 10h. 38m. A.
	—		☽ sets 6. 28. M.
13	2	57	Ecliptic oppo. or ○ full moon
	—		Occul. *i* Leonis, im. 4h. 50m. em. 5h. 38m.
13	16	30	♄ in □ with the ☉
	—		Mercury, R. A., 22h. 4m. dec. 13. 44. S.
	—		Venus, R. A., 23h. 1m. dec. 1. 14. N.
	—		Mars, R. A., 11h. 3m. dec. 10. 39. N.
	—		Vesta, R. A., 10h. 53m. dec. 17. 1. N.
	—		Juno, R. A., 11h. 48m. dec. 0. 28. S,
	—		Pallas, R. A., 18h. 45m. dec. 5. 56. N.
	—		Ceres, R. A., 19h. 26m. dec. 24. 33. S.

D.	H.	M.	
13			Jupiter, R. A., 19h. 11m. dec. 22. 27. S.
	—		Saturn, R. A., 3h. 33m. dec. 17. 11. N.
	—		Uranus, R. A., 2h. 26m. dec. 14. 6. N.
	—		Mercury pass mer. 0h. 32m.
	—		Venus pass mer. 1h. 28m.
	—		Mars pass mer. 13h. 28m.
	—		Jupiter pass mer. 21h. 36m.
	—		Saturn pass mer. 5h. 59m.
	—		Uranus pass mer. 4h. 53m.
14	1	10	♂ in conj. with the ☽ diff. of dec. 0. 45. S.
	5	58	♃'s second sat. will im.
15			Clock before the ☉ 14m. 26s.
	—		☽ rises 8h. 2m. A.
	—		☽ pass mer. 1h. 49m. M.
	—		☽ sets 8h. 36m. M.
	21	15	♂ in Aphelion
19			Occul. λ Libræ, im. 16h. 25m. em. 16h. 57m.
	14	17	☿ in conj. with ♀ diff. of dec. 9. 59. S.
20			Clock before the ☉ 14m. 1s.
	—		☽ rises 1h. 20m. M.
	—		☽ pass mer. 5h. 47m. M.
	—		☽ sets 10h. 5m. M.
	10	44	☽ in □ or last quarter
23	5	14	♃ in conj. with the ☽ diff. of dec. 3. 21. N,
	14		☽ in Perigee
	16	57	Vesta in oppo. to the ☉, intens. of light 0·971
25			Clock before the ☉ 13m. 20s.
	—		☽ rises 6h. 44m. M.
	—		☽ passes mer. 10h. 49m. M.
	—		☽ sets 3h. 2m. A.
26	6	12	☿ in the ascending node.
	6	41	♃'s first sat. will im.
	8	28	♂ in oppo. to the ☉
	4	5	♀ in conj. with the ☽ diff. of dec. 14. 49. N.
27	4	39	Ecliptic conj. or ● new moon
	17	46	☿ in conj. with the ☽ diff. of dec. 5. 32. N.
28	1	45	♀ in inf. conj. with the ☉

J. LEWTHWAITE, Rotherhithe.

THE

LONDON JOURNAL,

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CONJOINED SERIES.

No. CCLXVII.

RECENT PATENTS.

To PETER FAIRBAIRN, *of Leeds, machinist, and* FERDINAND KASELOWSKY, *of Berlin, engineer, for improvements in machinery for drawing, roving, and spinning flax, hemp, and other fibrous substances.*—[Sealed 28th April, 1853.]

IN carrying on the operation of drawing or elongating fibrous slivers, it is well known that the sliver should be held by some apparatus which, carrying it at a uniform speed to the nip or bite of the drawing-rollers, will allow only such fibres to slide forward as are actually taken hold of by the drawing-rollers. In the ordinary mode of drawing, roving, and spinning flax, hemp, or other fibrous substances, divers arrangements, known under the name of gills, have been used for the attainment of this object; but their complication makes them unfit for many purposes. It has also been customary to use one or more pairs of carrying-rollers, for supporting the sliver in its passage from the feeding-rollers to the drawing-rollers; by which means the fibres, though held at certain points, could not be prevented from slipping from one holding point to the other, and being drawn into knobs. According to the present invention the sliver is carried round a greater or less part of the circumference of one or more rollers, for the purpose of bringing the fibres in contact with so much of their surface as will cause an amount of adhesion and friction sufficient to retain all short fibres which are not yet taken hold of by the drawing-rollers, and to prevent them from moving forward at a greater speed than that at which

the surface of the retaining-rollers is moving. In order to increase the amount of adhesion, as well as that of friction, the sliver may be wetted before passing over the surface of the retaining-rollers; and an endless carrying-belt, made of leather, gutta-percha, or other suitable material, may be used for the same purpose.

In Plate VI., several applications of the retaining or friction-rollers are shewn. In fig. 1, *a, b*, are the drawing-rollers; *c, d*, the feeding-rollers; and *e*, is the retaining-roller. The sliver passes through the bite of the feeding-rollers, and over a part of the circumference of the retaining-roller *e*, (which is driven with about the same surface-speed as the feeding-rollers *c*, and *d*,) and proceeds to the bite of the drawing-rollers *a, b*, which move at a greater speed to produce the required elongation. Figs. 2, 3, 4, and 5, shew the arrangement suitable for fibres of longer staple. In fig. 3, one of the retaining-rollers being in contact with the pressing-roller *d*, serves, at the same time, as a feeding-roller. In fig. 4, three of the retaining-rollers are supplied with flanges, for the purpose of driving the roller e^1, by friction, while the remainder are to be driven by gearing. In fig. 5, *a, b*, are the drawing-rollers: the retaining and feeding-rollers are shewn at e^1, e^2, e^3, and *d*. *f**, *f**, is an endless band, which passes over the tension-roller *f*, and below the sliver on the rollers e^1, and e^3, and on the top of the sliver on the roller e^2. Fig. 6, shews an arrangement where only one retaining-roller *e*, is required,—the sliver being passed several times around that roller. The different laps are kept separate by the guide *h*. Fig. 7, shews an arrangement by which the same purpose is obtained by two rollers whose axles are divergent, so as to cause the sliver to run in spirals over the surface of the rollers *e, e*, (see fig. 8).

The feeding and drawing-rollers may be fluted as usual; but the surfaces of the retaining-rollers are to be left smooth. It may be found advantageous to have the rove resting on one of the drawing-rollers before it arrives at the nip; as the rubbing, in the direction of the motion, will have a tendency to turn back all the bent fibres.

The patentees claim, subjecting slivers to the action of friction surfaces, on their passage from the feeding to the drawing-rollers, in the manner and for the purpose above set forth.

To John Gilby, *of Beverley, in the county of York, Esq., for improvements in fire-arms.*—[Sealed 12th March, 1853.]

The improvements constituting the subject of the present invention are shewn in several views in Plate VI. In the improved rifle, a breech-case *c*, is substituted for the fore part of the stock of an ordinary gun; which breech-case is made of iron or steel, and varies in length according to the size of the gun, and is securely fastened to the stock by means of a breech-plate *n*, and a trigger-plate *g*, below; which trigger-plate forms a part of, or is securely fastened to, the breech-case, as represented in fig. 3. The breech is detached from the barrel, and has a joint at the end, as represented at *b*. Its bore, as seen at *a*, is slightly larger than the bore of the barrel. It is made to fit accurately into the breech-case, and can be moved up and down on the before-mentioned joint; the shape and position of which joint (as also of the other end of the breech where it meets the barrel) can be seen in fig. 3, which is a section. A spring *e*, with a roller attached to it, is fastened securely underneath the breech, in order to throw it up for the purpose of charging. At the fore end of the breech, on the under side, is a loop *f*, having a rounded projection which works against a spring-catch *k*, (fig. 2); so that, when the breech is pushed down after charging, it allows the spring-catch *k*, to enter the loop, and thus holds the breech securely down when the rifle is charged. This catch is again liberated, to allow the breech to spring up, after the rifle is discharged, by a stud and pin *h*, (fig. 6), passing through the breech-case, which is readily pushed by the left hand as the rifle is held. The catch above described is peculiarly applicable to rifles of small bore. To those of somewhat larger bore, the patentee applies the slide-bolt, shewn at fig. 5, working into the grooved projection on the breech (fig. 4), and moved by a spring, as shewn at fig. 1. For rifles of large bore, for sporting purposes, where great security is required, it is preferred to use the bolt seen at fig. 9, which will work into a loop on the breech, as seen at *f*, fig. 3, and pass completely across the breech-case. And, lastly, for military purposes, where great security is also required, and where complication of springs and such like apparatus is very objectionable, the mode of securing the breech, seen at fig. 7, is employed, which consists of a lever working on a hinge, and from which a bolt projects at *x*, (fig. 7). There is a handle of wood attached to it on the under side at *r*, which is immediately before the trigger-guard, and underneath the fore-

stock. This is easily moved by the left hand as the rifle is held; and the bolt is thus readily pushed into or drawn out from the loop *f*, according as the breech is required to be raised or lowered. A spring, the end of which is seen at *y*, fig. 2, and at fig. 8, and which may be fastened either to the back part of the breech-case, or to the breech-plate (according to the description of fire-arm required), works against the joint of the breech into a notch cut therein, and this holds the breech firmly in its place when in a proper position for charging. The bolt or pin *b*, on which the breech works, is slightly above the central line of the bore of the barrel, which materially relieves the tendency of the recoil of the charge to throw the breech up. The fore part of the breech-case is hollowed to fit the barrel (to which it is secured by a loop or loops, and a bolt or bolts), as shewn in section (fig. 3). The end of the barrel which meets the breech, and the upper end of the breech, are cut at similar angles, as shewn in fig. 3; so that the barrel and breech may be brought into direct and actual contact round the whole circumference of the bore (or so nearly in contact as may be found convenient), the barrel always remaining fixed and stationary. The ends of the breech and barrel are chamfered away, and a groove round them is cut in the inner circumference of the breech-case, to take off any gas and carbonaceous deposit which may escape at the juncture of the barrel and the breech, during the discharge, or to allow of their being deposited where they cannot impede the free action of the catch and springs, above described; and there is a slit *z*, in the bottom of the breech-case, through which they can escape into a tube or channel *l*, made of wood or metal, or a combination of them, fastened below the breech-case, which conducts the gas and deposit away from the hand of the person firing the rifle.

The second part of the invention consists of a method of priming, which is essentially a self-acting apparatus. *a*, fig. 3, is a metal tube, of a bore sufficiently large to admit the caps end to end, with a spiral spring *g*, inside, to force them forward, as required. This tube is inserted at the butt end of the stock, and is long enough to reach up to the detent *b*, which moves on a pin at *c*, and is forced up by the spring *d*. *e*, is a small connecting rod, which passes through the breech-case, and is acted upon by a shoulder or projection on the joint of the breech at *f*; forcing the detent down at the same time that the breech is shut down. A hole in that part of the detent, just opposite the end of the tube *a*, now receives a cap, forced into it by the before-mentioned spiral spring in

the last-mentioned tube. Thus, the store of caps is effectually closed against the influence of the weather; and in this position they remain till the breech is again thrown up for the purpose of charging, when the detent immediately springs up with its enclosed cap, and the nipple is projected into it, being thus primed by its own motion. After charging, the breech is again shut down, carrying with it the cap just put on. As this apparatus occupies the place usually taken up by the lock, the patentee places the lock on the opposite side of the stock, and brings the tumbler pin through the stock; so that the hammer occupies its usual place. It will be readily seen that the caps might be raised to the proper position for the nipple to enter them, by connecting the detent *b*, with the tumbler pin of the lock, or with the cock; so that the detent would rise with its enclosed cap by the action of cocking, and return to its place by a spring: this is the method preferred for pistols or other fire-arms, where great economy of space is required; but, for rifles, the plan first described is preferred. The patentee remarks that this part of the invention may be applied to other kinds of priming than detonating caps. The rifle is charged (either with or without cartridge) at the breech, thereby avoiding the weight and trouble of a ramrod, and saving about two-thirds of the time usually employed in charging. The barrel may be grooved on almost any of the usual principles; and the ball will fit perfectly to the barrel during its passage through it.

The patentee claims, First,—the securing the breech down during the discharge by a spring, slide, catch, bolt, (one or more of them, as seen in figs. 7, 9, 2, 6, 4, 5,) or any mere modification of them. Secondly,—he claims the method of throwing the breech up into a firm and proper position for charging, as seen in figs. 1, 3, 8. Thirdly,—the application of a groove or grooves, aperture or apertures, in the breech-case, round or near the juncture or point of contact of the barrel and the breech, with or without a tube or tubes, channel or channels, for the purpose of receiving or carrying off the gases or carbonaceous deposit which may escape between the breech and barrel during the discharge. Fourthly,—the method of priming, by throwing the breech up, and thus forcing the nipple into or against the priming; so that the nipple may carry off the priming, when the breech is returned to its place in the line or direction of the barrel. He also claims the methods, above described, of placing the priming in the proper position for the nipple to carry it off, and withdrawing the detent into the stock when the nipple has so carried it off.

Fifthly,—the application of the several principles herein specified, and the combination of them, or any of them, to every description of fire-arms.

To WILLIAM BLINKHORN, *of Sutton, in the county of Lancaster, glass manufacturer, for certain improvements in the construction of furnaces and annealing kilns employed in the manufacture of glass.*—[Sealed 17th March, 1853.]

THIS invention of improvements in the construction of furnaces and annealing kilns, employed in the manufacture of glass, applies, first, to the furnaces employed for melting or fusing the "metal;" and, secondly, to the furnaces or kilns for annealing or tempering the plates, discs, or sheets of glass. The furnace employed for melting or fuzing the metal is provided with a fire-place at each end. Immediately behind the fire-places are placed low bridges of fire-brick or clay. The melting-pots or "cuvettes" are placed behind the bridges, between them and a descending flue which is in the centre of the furnace. There is also a low bridge in front of the flue, in order to prevent the molten glass from running into the flue, in the event of any of the melting-pots or cuvettes fusing or breaking. The roof of the furnace is constructed in the form of a pointed arch, in order that if any portion of brick or stone, composing the furnace, should become fused it will run down the sides of the furnace, instead of dropping into the cuvettes, and damaging the glass. The furnace is furnished at one or both sides with openings or doors for removing and replacing the cuvettes. The flame from the fires passes over the bridges, around and over the cuvettes, to the descending flue, which conducts it to a general chimney, with which the flues of all the furnaces communicate. The heat is thus distributed much more equally around the cuvettes than in furnaces of the ordinary construction; and there is less liability of melting the cuvettes, as frequently happened heretofore. The heat is also greatly economised, and more under control; and, by supplying fuel to the furnaces alternately, all the smoke, &c., may be consumed. By this construction of furnace also, the conical chimneys, usually employed with each furnace, may be dispensed with; or, if preferred, they may be employed as chimneys by partially enclosing them above the furnace, and connecting the flue thereto.

The second part of this invention consists in a peculiar form of annealing kiln for annealing or tempering the plates,

discs, or sheets of glass. The mouth of the kiln is, as usual, level with the casting table; but the bottom or bed of the kiln, instead of being level with the mouth, is sunk below the same. The kiln is furnished with a table or receiver, formed of iron or other suitable material, which is so arranged as to be capable of being moved in a lateral direction, and also of being tilted or canted over. The plates, discs, or sheets of glass, to be tempered or annealed, are brought to the mouth of the kiln upon the table in the usual manner. The receiver being at one side of the kiln, a number of plates, discs, or sheets of glass, according to size, are placed thereon. It is then tilted over until they are placed in an almost perpendicular position, with their lower edges resting upon the bottom or bed of the kiln, and their upper edges resting against the side of the same. The receiver is then moved slightly in a lateral direction, and another series of plates, discs, or sheets of glass similarly adjusted, and so on until the kiln is charged. The annealing or tempering process is then carried on in the usual manner.

By the use of this mechanical means of adjusting the plates, &c., instead of the ordinary method of performing the same by hand, the liability of spoiling or breaking the plates is considerably lessened, and time and labor are greatly economised.

In Plate V., fig. 1, represents, in longitudinal section, the improved furnace for melting or fusing the metal. Fig. 2, is a vertical transverse section, and fig. 3, an horizontal section of the same. *a, a,* are the walls of the furnace; and *b, b,* the openings for removing and replacing the cuvettes, which openings are closed, as usual, by means of moveable fire-brick doors; *c, c,* are the fire-places, two at each end of the furnace; *d, d,* the bridges, immediately behind which, on the floor *e, e,* of the furnace, the melting-pots or cuvettes are placed; *f,* is the descending flue; and *g, g,* are bridges, to prevent the molten glass from running into the flue, in the event of any of the melting-pots or cuvettes breaking or melting. The opening of the flue *f,* may be either transverse, as shewn, or it may be formed in a longitudinal direction. *h, h,* is the roof of the furnace, which is constructed in the form of a pointed arch, for the purpose above mentioned. In using this construction of furnace, the conical chimneys may be dispensed with; but the patentee prefers placing them below the said chimneys, as usual; in which case it is necessary to enclose the greater part of the chimney above the furnace,—leaving only a small space for draught. The flue *f,* must then be made to ascend outside the furnace, and communicate with the chimney above the enclosure.

The improved construction of kiln for annealing or tempering the metal is shewn, in longitudinal section, at fig. 4. Fig. 5, is a transverse section; and fig. 6, horizontal section of the same. *a, a,* are the walls of the kiln; *b,* the roof; and *c,* the floor or bed; which, it will be observed, is much lower than the mouth *d,* of the kiln. The furnace is shewn at *e,* and the openings to the flue or flues at *f.* *g,* is the table or receiver, which is supported upon friction-rollers *h, h,* at each end, running in grooves, or upon rails, formed for that purpose. Immediately underneath the centre of the receiver *g,* is a shaft *i,* capable of turning loosely in suitable bearings, and having two spur-pinions *k, k,* keyed thereon. These pinions are in gear with two toothed racks *l, l,* one at each end of the furnace. The outer end of the shaft *i,* is squared, and upon it is placed a winch-handle *m;* by turning which, it will be evident that the receiver can be moved to and fro in a lateral direction. Upon the shaft *i,* is placed loosely a tube *n;* at one end of which is a cranked lever *o, o,* attached also to the edge of the receiver; and at the other is a hand-wheel *p;* by means of which the receiver can be held steadily whilst being charged with plates, discs, or sheets of glass, and subsequently tilted or canted over, in order to adjust the same in the required position.

The patentee claims, Firstly,—the peculiar form or construction of furnace for melting or fusing the metal, as shewn in the drawings, and above particularly described; more especially the descending flue, and the pointed form of the roof. And, Secondly,—the peculiar construction of annealing kiln, shewn in the drawings, and above described, having the floor or bed thereof sunk below the level of the mouth, and having a table or receiver, capable of being moved in a lateral direction, and of being tilted or canted over, in the manner and for the purpose above more particularly set forth.

To JOSEPH WESTWOOD *and* ROBERT BAILLIE, *both of Poplar, iron ship-builders, for improvements in the construction of iron ships.*—[Sealed 10th June, 1853.]

THIS invention consists in constructing the stem, stern-post, or stern-frame (where screw propellers are used), keel, and keelson of iron ships, of plates of iron rivetted or otherwise fastened together so as to form one solid mass, in lieu of constructing such parts of one thickness of metal. The same dimensions are adopted in the construction of these parts of

iron ships as are commonly followed by ship-builders; and plates of greater or less thickness and length are employed, according to the amount of strength desired to be obtained. The keelson is formed by carrying up one, two, or more of the central keel-plates above the level of the keel, and rivetting or otherwise fastening thereto side plates of iron, until the keelson is formed of the required dimensions.

The patentees remark, that as the construction of iron ships is generally well understood, and as the invention applies only to the particulars above mentioned, and involves in other respects no novel methods of building, they have thought it unnecessary to illustrate their description by reference to drawings; the explanation above given being sufficient to enable the invention to be put in practice with complete efficiency.

They claim the construction of the stem, stern-post, or stern-frame, keel, and keelson of iron ships, from plates of iron rivetted or otherwise fastened together, as before described.

To WILLIAM CHRISTOPHER *of Euston-square, and* GUSTAVUS GIDLEY, *of Robert-street, Hoxton, for improvements in abstracting sulphur and other matters from vulcanized India-rubber.*—[Sealed 16th June, 1853.]

IN manufacturing vulcanized India-rubber, or articles formed of that material, it is desirable, in many cases, after the usual operations of vulcanizing the caoutchouc or the manufactured articles themselves, to withdraw or separate some portion of the sulphur, or of the excess of sulphur, that remains interposed in the pores of, or is combined with, the caoutchouc; or, in other words, to adjust the relative proportions of the sulphur and the caoutchouc in the vulcanized material for either ordinary or any special application of it.

It is desirable also to be able to work up or re-employ refuse vulcanized India-rubber, such as the parings or cuttings, &c., that accumulate in manufactories of that material; or by some ready and economical method of treating such refuse to separate from it the sulphur, or so much sulphur as leaves the caoutchouc in a condition to be acted upon by its usual solvents, and consequently restoring it to a condition admitting of its being re-worked in any form, and, if required, re-vulcanized, either with sulphur or another material.

Now this invention consists in macerating the vulcanized India-rubber in a hot solution of carbonated alkali, or in a solution of hydrate of lime, or in hot water in which caustic

lime is suspended, till, through the action of the alkali or of the lime, the requisite quantity of sulphur is abstracted; that is, either as much sulphur withdrawn as reduces the relative proportions of the sulphur and the caoutchouc to those required for any special purpose, or so far removes the sulphur as to leave the residual material in a condition to be acted on by the usual solvents or softeners of caoutchouc, so as to adapt it for re-formation into manufactured articles, and of being revulcanized with sulphur or another material, if required.

The vulcanized caoutchouc, to be so treated, should, when it admits of it (as when the refuse parings or cuttings, &c., are to be worked up), be comminuted or cut up into small pieces; as the action of the alkali or of the lime is the more rapid in proportion to the extent of surface it acts upon, or the thinness of the pieces it has to penetrate. And as the higher the temperature of the solution or of the water the quicker is the operation, it is preferred to use a boiling heat in the process, though a lower temperature will subserve the same purpose finally, requiring only a greater length of time. When the caoutchouc has a large quantity of sulphur to be removed, it is preferred, from reasons of economy, in the first place, to boil it along with the caustic lime, which takes up the sulphur lying at or near the surface of the mass or pieces of the caoutchouc; then to remove the solution so produced and the lime, and boil with a solution of carbonate of soda. After some time the whole of the excess of sulphur or uncombined sulphur may be thus abstracted, and acted upon or rendered soluble in either the lime or the carbonated alkalies. In this way, after some time, and when the process is carried far enough, the sulphur in excess is abstracted, together with other matters, constituting impurities that may have been formed in the process of vulcanizing or afterwards manufacturing: the caoutchouc will then be found to be soluble in turpentine, naphtha, or any other of the usual substances employed to dissolve or soften caoutchouc. The patentees do not confine their processes to the order above specified, as boiling or heating the vulcanized material in a solution of carbonated alkali alone will abstract the sulphur, and leave the material in a workable condition; and lime-water, or lime and hot water, will, in time, fulfil the same purpose when used alone. But, for economy, the order as above stated is preferred. Neither do they restrict the practice of their invention to the use of the carbonate of soda or the carbonated alkali, for carbonate of potash will equally well abstract the sulphur, but it is not so economical as the soda salt.

On the addition to the vulcanized caoutchouc of the solution of the carbonate of soda, carbonic acid is evolved, and a sulphuret or polysulphuret of the alkali gradually formed; and this product can be applied to several useful purposes. But should the sulphur compounds thus formed with the alkali, and which are partly given off and liable to be diffused through the atmosphere during the operation, be found in any case to be objectionable, this is remedied by adding to the hot solution, during the process, some metallic oxide, as, for instance, oxide of copper, or some metallic carbonate capable of forming with the sulphur, as it is abstracted by the alkali, an insoluble sulphuret; thus fixing the sulphur in a form of combination that is unaccompanied by the disagreeable emissions given off by and peculiar to the alkaline and soluble sulphurets.

In producing the reactions between the sulphur of the vulcanized material and the alkali or the lime, the patentees, in some cases, find it advantageous to steam, or otherwise than by hot water to heat the mixed materials; and for some purposes they vary these processes, for effecting the union between the sulphur and the alkali or the lime, by employing either of those agents in its dry state, or with only a little water present; and, when mixed by any mechanical contrivance with the vulcanized India-rubber, steaming or otherwise heating the mixture, and finally removing the sulphuret, so mixed, by washing with water.

To render vulcanized manufactured articles or the refuse more soft and pliable, they may be advantageously washed in a solution of water and fullers' earth.

The patentees claim the before-mentioned processes for removing sulphur from vulcanized India-rubber manufactured articles, and also from refuse or spoiled vulcanized India-rubber cuttings, parings, or old manufactured articles; and of re-dissolving the same for new purposes.

To JOHN SMETHURST, *of Manchester, packer, for an improved plan for packing yarn and other materials.*—[Sealed 20th April, 1853.]

This invention consists in an improved method of packing yarn and other materials; which object is accomplished by constructing a box of wood or other suitable material,—the sides of such box being regulated, held, and drawn together by means of screw-bolts or other similar contrivances; which bolts serve as ends for the box. The top and bottom of the

box are called "stilliages," and consist of a piece of wood or other suitable material of the required size of the bale to be packed, and are grooved out or crossed, on one or both sides, with blocks of wood or other material, at certain distances apart; and the use of these grooves or cross pieces is to enable the bale to be bound with the hoop-iron, rope, or whatever may be thought proper, without removing it from the press. This is done by placing the hoop-iron, or whatever binding material is used, through these grooves. The top stilliage is secured to the top part of the press, and the bottom thereof to the moveable table of the press. This improved method of packing is applicable to all kinds of goods, whether it be yarn, calico, woollen cloth, or any kind of material whatsoever that is required to be packed, whether by hydraulic or other power.

The figure in Plate V., represents a side elevation of a press, with the improvements attached thereto. *a*, is the press; *b*, a portion of a hydraulic ram, with the table attached; *c*, the sides of the box, which are made of wood or other suitable material, in one or more parts; *d*, strengthening beams, of the same or other kind of material, being secured to the sides *c*, and open at the ends to admit of bolts being slidden in; *e*, strong iron bolts running from one side of the box to the other, for the purpose of holding together and regulating the sides *c*, which is accomplished by means of nuts or other similar contrivances at one or both ends of the bolts *e*. These bolts, when in their places, form the side of the box. *f*, is the stilliage, which forms the bottom of the box, and which is made of a strong piece of wood or other material of the size of the bales required, and is grooved out or crossed on one or both sides with beams of wood or other material, at respective distances. This stilliage is secured to the moveable table of the press by bolts or other similar contrivances. *g*, is the top stilliage, which is secured to the top part of the press, and may be made in the same manner as the lower stilliage. In this case it is shewn as being crossed on one side only with beams of timber, while the bottom stilliage *f*, is crossed on both sides. The object of these stilliages will be seen hereafter. When the yarn or other material is required to be packed, it is placed on the bottom stilliage *f*;—the sides *a*, are then put in their places, as shewn. The bolts *e*, are slipped into the openings of the beams *d*; and, by means of the screw at the ends, the sides *c*, are drawn as near together as required. The press is then worked,—bringing the top and bottom sufficiently near to press the goods: the

sides *c*, are then removed, and the bale is bound and secured without being taken from the press; the hoop-iron, or whatever is used for binding, being passed through the grooves in the stilliages. The bale is then removed from the press complete.

The patentee claims, Firstly,—the method of packing yarn or other materials in a kind of box,—the sides being capable of being drawn together by means of bolts or other similar contrivances; this being for the purpose of keeping the material compact, and in a right position during the operation of pressing. Secondly,—the method of binding the bale previous to removing it from the press by the use of the stilliages.

To JOHN CAPPER, *of Manor House, Earl's-court, Old Brompton, in the county of Middlesex, merchant, and* THOMAS JOHN WATSON, *of Devonshire-terrace, Fulham-road, in the same county, operative chemist, for improvements in preparing and bleaching jute and other vegetable fibres.*—[Sealed 12th January, 1853.]

IN the process of purifying, attenuating, and bleaching jute and other vegetable fibres—these fibres are first boiled or scalded in a chemical solution, composed of any of the following substances, viz.: soda, carbonate of soda, chloride of soda, muriate of soda, oxide and hydrate of soda, carbonate of potassa, chloride of potassa, bitartrate of potassa, nitrate of potassa, oxide of potassa, hydrate and hydrated oxide of potassa, carbonate of ammonia, nitrate of ammonia, and sulphate of magnesia. These chemicals are used in the following proportions:—140 lbs. of any of them are dissolved in from half a ton to two tons of water for every ton of jute or other vegetable fibre to be acted upon. In this solution, which is termed the steeping-bath, the jute or other vegetable fibre is placed, and allowed to boil or scald for two hours. At the expiration of that time it is removed and suspended upon laths or rope to drain off the water. It is next transferred to a bleaching-bath, prepared by the admixture of 560 lbs. of chloride of lime, soda, or magnesia, in two tons of cold water for every ton of jute or other vegetable fibre intended to be bleached. In this solution the material is allowed to remain for twenty-four hours: it is then withdrawn and washed in water and dried, and is then ready for the market. With some portions, however, when greater purity is required, after removal from the bleaching-bath, it is steeped for two hours in an

acid bath, composed of either sulphuric or muriatic acid, in the proportion of two lbs. of acid to one ton of cold water.

An acid bath may be employed as a steeping-bath, instead of the various chemicals previously alluded to, composed of either muriatic, fluoric, or sulphuric acids, in the proportion of 65 lbs. of either acid mixed with two tons of water for every ton of jute or other vegetable fibre to be acted upon. In this bath the fibrous material is steeped for twenty-four hours, then drained, and placed in the bleaching-bath, and treated as before described.

The jute or other vegetable fibre, after removal from the steeping-bath, may be suspended upon laths or rods (in a room prepared for the purpose), and exposed to the action of chlorine gas for six hours, previous to its being placed in the bleaching-bath. The jute or other vegetable fibre, when exposed to the action of the gas, should be thoroughly damp.

The steeping-bath may be employed without heat; but, in that case, the jute or other vegetable fibre will require to be steeped for twenty-four hours: it is then withdrawn, drained, and placed in the bleaching-bath for another twenty-four hours, and subsequently washed with either the cold water or acid solution, and dried, as before described.

The patentees claim the treating of jute and other vegetable fibres, as above described.

To JULIAN BERNARD, *of Guildford-street, Russell-square, Gent., for improvements in casting metals, and in moulding or forming other materials.*—[Sealed 25th April, 1853.]

THIS invention relates to an improved system or mode of casting metals or moulding plastic materials of any kind; whereby a much greater degree of sharpness and accuracy is obtained in the articles so formed. It consists in casting, moulding, or shaping metals and a variety of other substances, while in a liquid or plastic state,—such as iron, copper, brass, gutta-percha, caoutchouc, and their compounds, porcelain and earthenware of all kinds; such casting or moulding being effected in a partial vacuum obtained by extracting the atmosphere from the moulds or shapes in which the metal or other materials are to be cast or moulded. When plastic or soluble materials are to be shaped, they may, if found desirable, be pressed or forced into the exhausted mould by any convenient means.

When metals are cast according to this process, the pots,

ladles, or crucibles containing the metals, may have a hole in the bottom part plugged by a fire-brick or any other suitable material, and the pot placed over a channel or aperture communicating with or entering the mould; the communication being made air-tight by surrounding the bottom of the pot with loam or other suitable material. The moulds or shapes used in this process may be kept at any desired temperature by the application of steam, heated air, or cold water or air.

In Plate VI., fig. 1, represents a moulding-box and mould for a steam-engine cylinder in vertical section; fig. 2, is a vertical section of the crucible or ladle of molten metal, shewing the mode of supporting it, and of running the metal into the mould; and fig. 3, represents a vertical section of a mould for plastic material. *a*, *b*, (fig. 1), are the moulding-boxes, joined together by bolts at the flanges *c*. One of these boxes may be made with the bottom cast on as at *a*, whilst the other one *b*, is made in the ordinary manner, namely, open throughout, but is fitted with extra flanges at *d*, to receive the cover or plate *e*. Both boxes may be constructed with supporting-bars *f*, if their dimensions render such arrangement necessary. The mould is prepared in the ordinary manner, and the boxes *a*, and *b*, are securely bolted to each other by the bolts at *c*, *c*, in order to form an air-tight joint. The plate *e*, is then put in its place, and bolted tightly up, so as to exclude as much as possible the external atmosphere from the interior of the mould *g*. The crucible or ladle *h*, containing the metal, is supported on the fire-brick *i*, which is composed of two pieces, being divided longitudinally down the centre of the channel or passage *j*. Beneath the crucible or ladle and the supporting fire-brick is fitted a bed of loam *k*, upon which the ladle rests; whereby the atmosphere is completely excluded from the channel *j*, and from the interior of the mould. A plug of fire-clay *l*, is fitted into the aperture at the bottom of the crucible or ladle, and is kept in its place by the superincumbent pressure of the metal. A cock *m*, communicating with the interior of the mould, is temporarily fitted into the upper portion of the moulding-boxes, and is connected by any suitable flexible tubing with an air-pump or other exhauster. The ladle having been fitted into its place on the fire-brick *i*, the air is exhausted from the interior of the mould by the exhaustion before mentioned; and when a sufficient vacuum is obtained, the cock *m*, is shut, and the plug *l*, in the ladle withdrawn. The metal now runs or is forced by atmospheric pressure into the interior of the mould, until it reaches the

level of the cup *n*, in the upper portion thereof. This aperture is closed, before exhausting, by means of loam or a disc of metal *o*, fitted loosely over it; and when the exhaust takes place, the pressure of the atmosphere keeps it pressed down, and prevents the entrance of air to the interior of the mould. Upon the level of the metal reaching this point, the disc is displaced; and the pressure of the metal in the cup indicates that a sufficient quantity has been run in: the plug in the ladle is then immediately let down by a chain or cord attached to it, and the supply of metal is consequently stopped. By this means the metal is prevented from rising high enough to fill the mouth of the cock *m*, which would be a source of great inconvenience. When the casting is completed, the ladle is removed, and the supporting brick is divided longitudinally for the purpose of extracting the hard metal left inside. This system of casting will be found very desirable where a superior surface and sharpness of outline is required; such casting being perfectly free from air bubbles or impurities of any kind.

In moulding plastic materials, the matrices are formed of metal or hardened plastic material, as shewn in vertical section at fig. 3, which figure represents a mould for casting a flower-vase. The mould *a*, is formed in two parts, fitted with flanges and bolted together at *b*, to form an air-tight joint. The internal core *c*, of the vase is held in its place by the slightly overlapping conical portion *d*, at its upper end, which fits into a corresponding groove in the moulds. An exhausting cock is fitted to the mould at *e*; and an inlet *f*, for the admission of the material, is formed at the bottom of the same mould. Previous to casting, the mould is exhausted as before described,—the lower inlet cock *g*, being first closed. When the mould is sufficiently exhausted, the upper exit cock *e*, is shut, and the lower one opened: the plastic material will then be pressed into the mould by atmospheric pressure; or, if necessary, it may be forced in by mechanical pressure. The above-described process may be employed when great density and sharpness of outline is required, and for preventing air bubbles or porousness in a variety of articles formed of plastic materials.

In concluding his specification the patentee remarks that he does not confine or restrict himself to the precise details or arrangements which he has had occasion to describe or refer to, as many variations may be made therefrom without deviating from the principles or main features of the invention.

To Charles James Pownall, *of Addison-road, in the county of Middlesex, Gent., for improvements in the preparation and treatment of flax and other similar vegetable fibres.*—[Sealed 17th May, 1853.]

This invention consists of a mode of preparing flax and other fibrous vegetable substances, for the purpose of depriving them more effectually of their resinous and gummy matters, and thus obtaining a finer and more useful fibre for spinning purposes. In applying the process to flax, the patentee takes the flax straw, after it has been sufficiently retted or fermented by any of the well-known processes, out of the water in which it has been steeped; and, instead of drying it, with a view to scutching, as is now commonly done, subjects it, as soon as possible, and whilst still quite wet, to the action of water falling from a higher to a lower level, for the purpose of more effectually removing the resinous or gummy or glutinous matters which still remain in or are connected with it after fermentation. It will be found convenient to draw the flax-straw forward gradually through the space upon which the water falls, by any of the means ordinarily used for giving a slow and gradual forward motion, such as an endless belt or apron moved forward at an uniform speed by machinery. The mode of treating other fibrous vegetable matters for the purposes above mentioned is the same as that described with reference to flax.

The patentee claims the subjecting fibrous vegetable substances, whilst wet and swollen from steeping and fermentation, to the pressure and action of water falling from a higher to a lower level, for the purpose of more effectually pressing out and washing away the gummy, resinous, or glutinous matters still remaining in the said vegetable matters, as hereinbefore explained.

To Thomas Richardson, *of Newcastle-upon-Tyne, manufacturer, for improvements in the manufacture of certain salts of magnesia and a red coloring matter.*—[Sealed 14th June, 1853.]

This invention consists in diffusing impure carbonate or hydrate of magnesia in water, and passing carbonic acid, obtained from coke or other sources, through the same. After allowing the impurities to subside, the clear supernatant liquid is drawn off and boiled, or otherwise treated, to obtain the ordinary carbonate of magnesia. And this inven-

tion also consists in heating sulphate of iron, or impure sulphate of magnesia containing sulphate of iron, with ground fluor spar, for the purpose of obtaining coloring matter and sulphate of magnesia.

The impure hydrate of magnesia, which is a waste product in what is known as Ward's process of carbonating soda ash, is said to be especially adapted for the manufacture of carbonate of magnesia by this process; but any other impure hydrate or carbonate of magnesia free from lime, or nearly so, such as magnesite, may be employed.

In treating any of these forms of magnesia, they are diffused through water, so as to form a cream or milk-like liquid, which is run into a large soda-water machine, and carbonic acid is pumped thereon, in the same manner as when soda-water is being made. Or a wooden box, divided into cells, by partitions running from the top and bottom alternately, is partially filled with this milk-like liquid; and, by means of a steam-jet or air-pump, worked by suitable machinery, a stream of carbonic acid is drawn through the whole series of compartments from a furnace filled with coke or charcoal. When the liquid becomes saturated with bicarbonate of magnesia, or stands at 5° to 11° on Twaddell's hydrometer, it is drawn off, and, after standing about an hour, a small quantity of a cream of magnesite is gradually added, which carries down all oxide of iron and other impurities, leaving a clear pure solution of bicarbonate of magnesia. This solution is heated to expel the excess of carbonic acid: the carbonate then precipitates, and is collected and treated in the usual way; or a quantity of pure magnesia, in suspension in water, is added, until the whole is precipitated as carbonate of magnesia.

The furnace employed for producing carbonic acid is filled with coke or charcoal, and is supplied with air through an opening at the bottom, and another higher up, on a level with the top of the fuel. The air may be drawn through by means of a jet of steam or otherwise, or forced forwards by a blowing-cylinder or blast-fan, so regulated by valves or dampers that the supply of air, entering at the upper opening, shall be a little more than sufficient to convert all the carbonic oxide into carbonic acid, so as to economize the fuel, and render the action of the gas more energetic on the milk of magnesia. Carbonic acid, obtained from any other source, answers equally well.

The character of the furnace is shewn in elevation in fig. 1, Plate VI., and in cross section in fig. 2. *a*, represents a blast-fan, which may be replaced by a blowing-cylinder; *b*, and

c, are the two pipes which convey the air above and below the coke or charcoal *d*; and the relative quantities are regulated by the valves *e*, and *f*. The carbonic acid passes off at *g*. The ashes and scars are removed at *h*, and the coke is thrown in at the door *i*. Grates may be employed, as shewn at *k*, when the ashes do not scar.

At present, in some manufactories, the impure sulphate of magnesia is calcined at a high temperature, in order to convert the iron and manganese into insoluble oxides. This operation is attended with considerable loss of sulphate of magnesia, even with the addition of magnesia to the impure Epsoms previous to calcination. To obviate this loss, one part of fluor spar for every four parts of the sulphates of iron or manganese present in the impure Epsoms, is employed, together with the ordinary quantity of magnesia; and this mixture is calcined at a very low temperature. A double decomposition ensues between the metallic sulphates and the fluor spar; while the metals are rapidly peroxidized and rendered insoluble. The calcined materials are lixiviated and treated in the usual way for obtaining pure Epsom salts, while the metallic oxides may be employed as a coloring material. Fluor spar may also be calcined with the sulphate of iron in the manufacture of Venetian red. The copperas and fluor spar are mixed in the same proportions as are already named; and so much less gypsum is used as to correspond with that produced from the fluor spar during the operation; the other materials of the batch remaining the same. The operation is conducted in precisely the same manner as at present; but the oxidation is found so much more rapid and perfect, that one furnace turns out as much crude Venetian red as three without the use of the fluor spar.

The patentee claims the treating impure magnesia, such as results from Ward's process, or magnesite, or such like mineral, with carbonic acid and water, as described above, in the manufacture of pure carbonate of magnesia. He also claims the use of fluor spar and sulphate of iron for making a red coloring matter, either alone or in connection with the preparation of pure sulphate of magnesia.

To Charles Heard Wild, *of St. Martin's-lane, civil engineer, for improvements in fishes and fish-joints for connecting the rails of railways.*—[Sealed 16th March, 1853.]

This invention for connecting the rails of railways consists in forming a recess or groove in one or both sides of each

fish, so as to reduce the quantity of metal at that part, and to be adapted to receive the square heads of the bolts, which are thus prevented from turning round when the nuts are being screwed on. A washer may be inserted in the groove between the fish and the nut. These grooved fishes may be used in pairs, and connected to the rails and to each other by bolts and nuts or rivets, of the same or unequal diameters, or a single grooved fish may be used in connection with a fish-joint chair.

Rails between two fishes, or between a fish and a fish-joint chair, are fixed by three or more bolts and nuts or rivets; and the central bolts or rivets are made of larger diameter than the external ones, as the strain is chiefly at the joint. Fish-joints are also made by dividing the rail longitudinally, and arranging the parts so as to break joint with one another, and placing a fish at each joint. Fishes are also constructed with projecting plates or wings, which form a seating, and which are perforated with holes to receive bolts, spikes, or rivets, by which they are secured to the sleepers or bearers of the railway, and thus serve as joint-chairs. The fishes are firmly bolted or rivetted to the rails; and being also secured to the sleeper or bearer, a very strong and firm joint is thus made. Those parts of rails and fishes which come in contact with each other are planed, in order to produce a more perfect contact of the bearing parts.

In Plate V., fig. 1, is an elevation or side view of portions of two rails united by a fish-joint; fig. 2, is a section of the same at the line *a, a,* in fig. 1; fig. 3, is a section at the line *b, b*; and fig. 4, is a section at the line *c, c,* in fig. 1. *d, e,* are the rails; *f, f,* are the fishes, secured by the bolts *g, g, h, h,* and nuts *i, j*; and *k, l,* are washers, placed between the rails and the nuts. The fishes *f, f,* are made with a groove or recess in their outer surfaces; which groove serves to receive the square heads of the bolts *g, h,* and prevent them from turning round when the nuts are being screwed on or off. Washers *k, l,* are placed in the groove of the fish which is next to the nuts, so as to allow of the nuts being turned round. Or the fish on this side may be made without the groove. The position of the bolts and nuts may be reversed, if preferred, so that the nut may be prevented from turning round while the bolt is screwed into it. The groove renders the fish lighter for equal strength, or stronger for an equal weight of metal, than a fish which is made of equal thickness throughout. The top and bottom of each fish is a plane surface; and the parts of the rail with which they come

in contact are also plane surfaces, forming the same angle as the top and bottom surfaces of the fish. The fishes are thus made to fit into their places with greater facility than if these surfaces were of curved or irregular forms. If, however, the surfaces of the rails are curved, the fishes may be made to fit them.

The central bolts *g, g,* are made of larger diameter than the extreme ones *h, h,* as the strain is greatest upon the central bolts. Rivets may be employed in lieu of bolts and nuts, if preferred. When three bolts and nuts or rivets are employed, the central one is made of larger diameter than the other two. When rivets are employed, the groove in the fish permits the employment of rivets, whose heads are thicker, with the same amount of projection from the side of the rail, or which project less, with the same thickness of head, than when plain ungrooved fishes are employed. This is a matter of great advantage, as avoiding the danger of the flanges of the wheels of the carriages coming into collision with the rivets. The grooved fishes are manufactured of wrought iron, by rolling it between rollers of corresponding forms, in a similar manner to that in which railway bars and other wrought-iron bars are manufactured. The bars are then cut to the required lengths.

Fig. 5, is a plan, shewing two rails *d, e,* united by a grooved fish and a fish-joint chair; fig. 6, is a side view of the same, shewing the fish-joint chair; and fig. 7, is a section of one of the rails, shewing an end view of the fish and chair. *d,* and *e,* are the rails; *f,* is the grooved fish, which is similar to those already described; *g, h,* are the bolts; *i, j,* are the nuts; and *m,* is the fish-joint chair, which is fitted to the side of the rails. The rails are secured between the fish *f,* and the fish-joint chair *m,* by means of the bolts and nuts.

Fig. 7*a*, shews a modification of this joint, in which the chair is made to touch the rails at the points *a**, *b**; instead of fitting between the two heads of the rail, as in fig. 7: the fair bearing of the bottom of the rail on the chair is thus insured.

Fig. 8, is a plan, shewing another mode of constructing and applying fish-joints for connecting the rails of railways; and fig. 9, is a section of the same. The rail is made in two pieces *d,* and *e,* and may be called a split or divided rail. The two pieces *d,* and *e,* are placed so as to break joint with one another; and a fish *f,* is placed at each joint, and secured by bolts and nuts or rivets passing through it, and through both portions of the rail. The rail is supported in

flat plates or chairs *n, n,* having lips *o, o,* which embrace the lower flange of the rail. Or the lower part of the split rail may be made similar to the upper part; and it may be supported in chairs, in the usual manner. The surfaces of the rails, which come in contact with each other, may be flat; or one or both of them may be made with a projection or projections fitting into a corresponding recess or recesses in the other.

Fig. 10, is a plan, shewing two rails *d, e,* connected by a pair of grooved fishes *f, f,* made with projecting wings *n, n,* which rest upon, and are firmly secured to, a sleeper or bearer.

Fig. 11, is a section, shewing this arrangement as adapted to a transverse sleeper; and fig. 12, is a similar section of the same, as adapted to a longitudinal bearer. *f, f,* are the grooved fishes, which are bolted or rivetted to the rails, and secured to the sleeper or bearer *p,* by bolts and nuts, or spilees, or treenails, passing through perforations in the wings *n, n.* The rail does not itself rest upon the sleeper or bearer, but is supported entirely, by its sides and upper flange, by the grooved fishes; so that the weight is distributed over the whole area of the projecting wings, instead of being concentrated upon the comparatively small portion of the sleeper or bearer which is directly under the rail.

In order to make the rails and fishes fit closely to each other, the surfaces which are intended to come in contact with each other are planed. This is effected by means of rotary steel cutters, as shewn in figs. 13, and 14. Or the rails only may be planed, and the fishes may be used without being planed; or the fishes may be planed and the rails left unplaned. The rails and fishes are planed by passing them slowly under the rotary cutters *p,* and *q,* figs. 13, and 14, while the same are caused to revolve. It is not necessary to plane the whole length of the rail, but it will suffice to plane the ends at the parts where the fishes are to be secured. Although rotary cutters are mentioned, as being employed for this purpose, any other mode of planing the surfaces may be employed.

The patentee claims, Firstly,—the constructing fishes for connecting the rails of railways with a groove adapted for receiving the heads of the bolts or rivets employed for securing such fishes, and the application of such fishes for connecting the rails of railways in manner hereinbefore described. Secondly,—the constructing fish-joints for connecting the rails of railways by means of fishes applied to the joints of divided or split rails, in manner hereinbefore described.

Thirdly,—the constructing fish-joints for connecting the rails of railways with fishes, secured by three or more bolts and nuts, or rivets, of which the central bolt or bolts, or rivet or rivets, is or are of greater diameter than the extreme ones, as hereinbefore described. Fourthly,—the constructing fish-joints for connecting the rails of railways with grooved fishes fitted to the sides of the rails, and secured to them by bolts and nuts or rivets, and having projecting wings firmly secured to and resting upon the sleepers or bearers, so as to support the rails by their sides and upper flanges in manner hereinbefore described. And, Fifthly,—the constructing fish-joints for connecting the rails of railways with rails and fishes, having the touching surfaces of one or both of them planed, as hereinbefore described.

To JAMES WEBLEY, *of Birmingham, manufacturer, for improvements in the construction of repeating or revolving and other pistols and fire-arms.*—[Sealed 29th March, 1853.]

THE improvements forming the subject of this invention are shewn in several views in Plate VI. Fig. 1, represents in vertical longitudinal section, a repeating or revolving pistol, with some of the improvements applied thereto. *a*, is the fixed barrel, and *b*, the revolving chamber, containing the barrels in which the detonation of the gunpowder is effected. *c*, is the trigger, and *d*, the cock or hammer, which turns upon the centre *e*. *f*, is a pin or stud formed on the lower end of the spring *g*, (shewn in dotted lines,) and attached to the distant side of the hammer or cock *d*, at the point *h*. The pin or stud *f*, comes through a hole in the hammer or cock; and the end of the pin or stud, which is bevilled off or inclined, projects on the near side of the hammer or cock *d*. The head *i*, of the trigger *c*, bears against the back of the pin *f*; and on pressing the trigger *c*, the hammer or cock is raised, until the head *i*, of the trigger *c*, escapes under the pin *f*, when the hammer or cock *d*, falls, and discharges the pistol. On removing the finger from the trigger *c*, the head *i*, of the trigger returns over the inclined face of the pin *f*, and, pressing back the pin, resumes the position represented in fig. 1: the pin *f*, is again shot forward by its spring *g*; and the head *i*, of the trigger engages behind it. The arm *l*, by which the revolution of the chamber *b*, is effected, is attached to the hammer at *k*; and a stop, to arrest the chamber at the proper point, is jointed to the top of the trigger. When it is wished to raise

the cock or hammer from the nipples *m*, by a partial pull of the trigger, and to leave it in that position till, by a further pull of the trigger, it is raised further and disengaged so as to discharge the pistol, (that is to say, to be able to "half-cock" the cock or hammer *d*,) a lever *n*, is used, which turns upon the centre *o*, and is pressed against the under side of the hammer by the spring *p*. If the trigger *c*, be so far pressed as to bring the tooth *q*, past the end *r*, of the lever *n*, and the pressure then be removed from the trigger, the end of the lever *n*, will engage behind the said tooth *q*, and prevent the falling of the cock or hammer *d*. By pressing the trigger *c*, until its head *i*, escapes under the stud *f*, the spring *s*, resting on a shoulder of the trigger, as represented (and by which the return motion of the trigger is effected), will be so far raised as to bear against the end n^1, of the lever *n*, and disengage the end *r*, from the tooth *q*;—the hammer *d*, will thereby not be obstructed in its fall by the lever *n*.

The second part of this invention is shewn at fig. 2, and consists of another method of effecting the half-cocking of repeating or revolving fire-arms. In carrying this part of the invention into effect, the head t^1, of the trigger *t*, is made of the pointed form represented; and a tooth *u*, on the under side of the hammer or cock *v*, is formed in such a manner that by the partial rising of the hammer, effected by applying the thumb at *w*, the head t^1, engages behind the tooth *u*, and cannot be disengaged therefrom by pressure on the trigger *t*. By pulling back the hammer *v*, till the head t^1, of the trigger *t*, engages behind the shoulder *x*, of the hammer, the hammer is brought into a position from which it can be released by pressure upon the trigger *t*; for the shape of the shoulder *x*, permits of the escape of the head t^1, of the trigger *t*, from behind it, by pressure on the said trigger. *y*, is the arm, by which, on raising the cock *v*, the revolving chamber is turned; and *z*, the stop by which the chamber is stopped at the proper place for the discharge.

This invention relates, thirdly, to a method of connecting the barrel *a*, fig. 1, with the frame of the pistol; which arrangement will be best understood by reference to fig. 3. A jointed pin 1, is attached to the lower side of the barrel *a*: the said pin 1, slides in a cylindrical hole 2, made in the frame 3, of the pistol. By withdrawing the barrel *a*, until the joint 4, is external to the hole 2, the barrel may be turned down upon the joint 4, and the revolving chamber removed from the axis 5. The barrel is held in its position by a bolt 6; and the bolt 6, and also the pin 1, are prevented from being wholly

withdrawn, in the manner hereinafter described. A modification of the above is shewn at fig. 2, in which the barrel 8, is connected by a joint 9, to the frame 10, of the pistol,—the end of the axis 11, of the revolving chamber being bevilled off at top, as represented, for the purpose of permitting the turning of the part 12, upon the joint 9.

This invention relates, fourthly, to a method of preventing the bolt 6, figs. 1, and 3, (which fastens the barrel *a*, in its place) from being wholly withdrawn. This consists of a screw 7, (see fig. 4,) which represents, in front view, the part of the frame attached to the barrel *a*: the end of the screw enters the groove 13, made in the edge of the said bolt, but is not continued to the end thereof. The bolt 6, can only be withdrawn till the end of the screw comes in contact with the end of the groove 13, when the further motion of the bolt 6, is arrested. This means for preventing the withdrawal of the pin or bolt 1, fig. 3, is attached to whatever parts of pistols and other fire-arms the same may be applicable.

And, lastly, this invention consists in making the middle portion of the axle on which the revolving chamber of revolving or repeating fire-arms turns, of a square or prismatic figure, as represented at 5, figs. 1, and 3. By this improvement the oil and dirt from the ends of the axle work into the middle part 5, of the axle, where they accumulate without interfering with the working of the chamber.

The patentee claims, Firstly,—the action or mechanism for the lock of a revolving or repeating pistol or other fire-arms herein described, and represented in fig. 1. Secondly,—applying the action or mechanism herein described, and represented in fig. 2, to repeating or revolving pistols and fire-arms. Thirdly,—the methods herein described and represented in figs. 2, and 3, of connecting the barrel of repeating or revolving pistols and fire-arms to the frames thereof; also the method of preventing the complete withdrawal of the bolts used in fire-arms, illustrated in the figs. 1, and 3, as well as in fig. 4. Lastly,—making the middle part of the axles of revolving or repeating fire-arms of a square or prismatic figure.

To JOSEPH WALTER GALE, *of Woburn-place, Russell-square, civil engineer, for improvements in the permanent way of railways.*—[Sealed 27th April, 1853.]

THIS invention relates, first, to an improved construction of sleeper for the permanent way of railways; and, secondly, to

an improved construction of chair, with an improved system of securing the same to the rails. The improvements consist in the employment of clay, or compounds of clay, with other substances of a harder nature, containing quartz or other silicious materials, for the purpose of manufacturing railway sleepers; by the use of which substance sleepers can, with great facility, be manufactured of various forms, and in one or more parts; the materials being of a nature to resist the action of natural decay or corrosion for a considerable period. The use of these substances will also involve the adoption of improved chairs, and of a new method of fastening chairs or rails, part of which may be applicable to ordinary sleepers.

The principal feature of this invention is the employment of a compound of one or more kinds of clay and pulverized stone, sand, or ground pottery, or all combined; the object being to mix and temper the stronger descriptions of aluminous earths with the milder ones, or with sand, so as to produce a compound of considerable tenacity and hardness, when fired. The earths preferred are the various kinds of pottery clay, mixed with the ordinary loam employed in brick-making, which clay is found in the London basin, and contains a certain amount of silicious matter; but, should the clay employed be deficient in that substance, fine sand should be added. A sleeper thus composed is made in a similar manner to drain-pipes, either by machinery or by hand, or by both combined: when properly dried, it is burnt or fired in the ordinary manner. For facilitating the drying and firing, the sleepers are moulded with longitudinal openings. The sleepers may be formed in one piece, or in several pieces cemented together; or they may be composed of ordinary bricks or tiles, laid in a trough, and grouted with cement. Bond iron, metal wire, hempen yarn or rope, rushes, or other bonding material, may be interposed between the bricks or tiles, to give tenacity to the mass: the whole of these sleepers may be used either longitudinally or transversely. The chair employed for holding the rails is attached to the sleeper by means of screw-bolts, formed with stirrups, for the reception of a bar of iron, which serves as a tie-bar, to preserve the gauge of the line. One of these bolts serves to fasten the rail, by keeping a metal jaw in close and firm contact with its side; thereby obviating the use of keys or wedges. A second form of chair is fitted with a pair of lugs, which clip the sides of the sleeper, being secured thereto by a transverse cottar or key. The chair is formed of two distinct pieces or cheeks, fitting one into the

other, and the rail is held between them by driving up the cottar before mentioned. The first form of chair, or any other form, is also attached to these sleepers; or, if no chair is employed, then the rail may be attached by the employment of lead, which is run into a cavity left in the sleeper for that purpose, either round a bolt with a ragged end, and with a thread cut in the upper end, fitted with a nut; or it may be run in first, and a hole bored in it, for the reception of the screwed end of a bolt, which has a head formed on the upper end, and passes through the chair or rail; thereby effectually securing the same to the sleeper, by screwing it up. The cavity is made larger at the bottom than at the top, to keep the lead securely in its place. Either of these chairs may be employed with other sleepers; the ends of the bolts, in the first arrangement, being screwed or not, as found necessary,—or trenails may be substituted for them.

In Plate VI., fig. 1, represents a transverse section of a rail, with its chair and transverse sleeper; fig. 2, is a plan, and fig. 3, an end view of the same. *a, a,* represents the sleeper, with the openings *b, b,* to facilitate the drying and firing of the same. These holes answer the double purpose, also, of effectually draining the ballast upon which the sleeper rests; and, when longitudinal sleepers are employed, they will serve to conduct telegraph or signal wires, if desired. The chair *c,* is attached to the sleeper by the bolt *f,* which is formed with a stirrup at one end, through which passes the tie-bar *h, h.* The side piece *d,* which is fitted into the chair, is for the purpose of holding the rail securely in its place, without the use of keys or wedges. This side piece is held down by the bolt *g,* which is also formed with a stirrup end, and embraces the tie-bar. Beneath the chairs is fitted a slightly elastic bearing surface *i, i,* which may be composed of wood, soft metal, gutta-percha, vulcanized India-rubber, felt, or other suitable material, to deaden the shocks occasioned by the passage of trains along the line.

Fig. 4, represents in side elevation a modification of the improved chair and fastening; and fig. 5, represents a horizontal section of the same. This chair is composed of two pieces *c,* and *d;* the sleeper upon which it rests being composed of two or more pieces *a, a,* formed with overlap joints. The pieces or jaws *c,* and *d,* fit into each other, and are brought together and tightened up by the key *g,* which passes through them at their lower extremities, and through the side lugs *f, f,* which fit over the sleeper. Thus, by drawing up the key *g,* the rail contained between the jaws of the chair is securely

held in its place, and the chair is fastened on to the sleeper simultaneously.

Fig. 6, represents another form of sleeper, with the chair attached by means of lead or other soft metal. *a, a,* is the body of the sleeper, formed with longitudinal openings *b, b,* as hereinbefore described. A dove-tailed cavity *l,* is formed in the upper portion of the sleeper, and filled with lead; and into this lead are screwed the bolts *f,* for securing the chairs.

Fig. 7, is an end view of a sleeper composed of tiles or brick-work; and fig. 8, is a partial side elevation of the same.

The patentee claims, Firstly,—the general arrangement and construction of permanent way, as hereinbefore described. Secondly,—the application and use of plastic or aluminous and silicious earth, for the manufacture of railway sleepers; such sleepers being composed of one or more pieces, as hereinbefore described. Thirdly,—the application and use of bricks or tiles, separately or combined, for the construction of railway sleepers, as hereinbefore described. Fourthly,—the system or mode of constructing earthenware sleepers, whether longitudinal or transverse, with passages or openings throughout their entire length, in the manner and for the purpose hereinbefore set forth. Fifthly,—the peculiar construction of railway chairs hereinbefore described, with reference to figs. 1, 2, and 3. Sixthly,—the peculiar mode of securing railway chairs to their sleepers, as described with reference to figs. 1, 2, and 3. Seventhly,—the peculiar form of chair, with its fastenings, as hereinbefore described with reference to figs. 4, and 5. And, Eighthly,—the application and use of lead or other soft metal for securing railway chairs to the sleepers, in the manner hereinbefore described and shewn at fig. 6.

To Auguste Edouard Loradoux Bellford, *of Castle-street, Holborn, patent agent, for an improved method of treating flax and hemp, whereby they are brought to such a state that they may be carded, spun, and woven by machinery, such as is now employed in the manufacture of cotton and wool into yarn and cloth,—being a communication.*—[Sealed 23rd May, 1853.]

This invention consists, first, in the employment of a solution of the sulphate of alumina, alum, borax, common salt, Epsom salt, Glauber salt, nitre, sal-ammonia, or an equivalent of any one of these, in which the flax is immersed, in order to split the flax into fine fibres, whose strength and ductility

is so preserved as to enable them to be readily carded, spun, and woven; and, secondly, in bleaching the said flax in the aluminous, borax, or other solution, by the employment of the chloride of lime, or the chloride of soda, or potash, in the said aluminous, borax, or other solution.

The inventor takes unretted flax, and cuts it into such lengths as may be required by the manufacturer for the particular kinds of goods he intends to use it in. It is cut in a machine similar to a straw-cutter. This cut flax is subjected to the action of steam, in any proper steam-tight vessel, for about eight or ten hours; and it is then taken out and dried. After this it is broken on a cotton lapping-machine, when it becomes fit for the splitting or cottonizing process. This process is conducted as follows:—Take a proper vessel of wood or metal, and of such a size as may be required for the amount of flax to be operated upon. In this vessel make up a solution of about 1 lb. of alum, or sulphate of alumina, or any of the other salts or substances named, such as borax, &c., for every 100 lbs. of flax to be treated, in as much water as will saturate and cover up the flax in the said vessel; leaving it for from five to twenty minutes. During this period the solution will so act upon the flax as to open up or split it into very fine fibres, and that without detracting from its strength and toughness. After this the split flax may be bleached in the ordinary way; but, to save time and labor, the inventor bleaches it in an aluminous, or borax, or salt and chlorine solution. When it is judged, by observation, that the flax is split, pour in a solution of the chloride of lime. For 100 lbs. of flax, from 5 lbs. and upwards of the chloride of lime is used, and, after being stirred up in water, it is allowed to settle. Next take the clear liquor of this solution and pour it into the vessel containing the flax in the aluminous, borax, or salt solution, and allow the flax to remain in this compound liquor for about from ten to twenty minutes; at the end of which time the flax will be found to be bleached to a beautiful white. After this take out the flax and wash it thoroughly in clean water, and afterwards dry it. It is then fit to be worked upon any kind of cotton or woollen machinery for making yarn or cloth.

The patentee claims treating flax or hemp with an aluminous solution, in the manner substantially as described; or treating flax or hemp in a solution of either alum, borax, chloride of soda, sulphate of soda, sulphate of magnesia, nitrate of potassa, or sal-ammonia, or an equivalent of any one of these, in the manner substantially as described, for the

purpose set forth. He also claims the bleaching of the said flax in the aluminous solution, in the manner set forth, and for the purpose described.

To John William Perkins, *of Narrow-street, Limehouse, in the county of Middlesex, analytical chemist, for improvements in the manufacture of artificial manure.*—[Sealed 20th June, 1853.]

This invention consists in fixing the salts and odorous gases usually contained in fœcal fish or fish-refuse, by the use and admixture therewith of either sulphuric acid or hydrochloric acid, by which the nitrogenous matters contained therein will become fixed. The patentee, by preference, uses an admixture of both acids, which are poured into a tank containing the fœcal matters, and are then agitated in combination with the ammoniacal liquor from gas works, or the liquor ammonia from animal charcoal: a fixed salt, or a muriate or sulphate of ammonia, or nitrogenous matter, as the case may be, is thereby obtained. The mass should then be well stirred, so as to effect a combination of the salts and gases contained in the organic matters; after which an absorbent matter is added, consisting of gypsum, bone dust, animal charcoal, sugar, scum, appatites in fine powder, or native phosphate of lime, sulphate of soda, sulphate of potash, chloride of sodium, charcoal, or any of them, or a mixture of any of them; the quantity of free acid required being always sufficient to render the phosphates soluble. These matters are incinerated together in suitable ovens, heated to a temperature of from 200 to 800° Fahr., to render the matters sufficiently dry for commercial purposes; in which state the mixture is put into bags ready for use; and such mixture or artificial manure will be found to possess greater fertilizing power than the artificial manures as hitherto manufactured.

DESCRIPTION OF THE PROCESSES.

Process No. 1.—Superphosphate of lime is first made by decomposing appatites, phosphorolites, coprolites, bones, or bone-ash, in hydrochloric acid, sulphuric acid, nitric acid, or any one of them, or a mixture of any two or more of them; and such superphosphate of lime is employed for the purpose of supplying that proportion of inorganic matter necessary for the developement of vegetable life. In making superphosphate of lime from any of the above-mentioned matters or ingredients, it is preferred, for the purpose of effecting such

decomposition, to use a mixture of hydrochloric and sulphuric acid, in the proportion of about two-thirds of sulphuric acid to one-third of hydrochloric acid.

Process No. 2.—Another and better mode of making superphosphate of lime according to this invention is as follows:—Take appatites, phosphorolites, coprolites, bones, bone-ash, or any of them, or a combination of any of them, and heat them to a dull red heat in a reverberatory furnace. Whilst in that state combine them with the acids above mentioned, or any one of them, or a mixture of any two or more of them, in the manner usually practised of making superphosphate of lime, and by these means superphosphate of lime will be produced. In using the acids it is preferred to use the mixture, and in the proportions, described in process No. 1. The superphosphate of lime obtained by either of the above-mentioned processes as a powder, is reduced to a powder by any of the known means for effecting the same, for the purpose of causing the absorption of night-soil, fish, or fish-refuse, or other organic matter previously decomposed by the application of sulphuric acid, or any other of the above-mentioned acids, or any mixture of them, in the proportion of about 10 per cent. thereof; and thus superphosphate of lime compost is produced.

Process No. 3.—Another part of the said improvements consists in decomposing or carbonizing night-soil, fish, fish-refuse, or other organic matters, by the use of large quantities of hydrochloric acid, sulphuric acid, nitric acid, or any one of them, or a mixture of any two or more of them, for the purpose of producing superphosphate of lime compost direct, by the addition thereto of appatites, phosphorolites, coprolites, bones, bone-ash, or any one of them, or a combination of any two or more of them. And to the said superphosphate of lime compost, whether made under this process or under processes Nos. 1, or 2, the patentee applies and combines soluble silica, converted by any of the known means into silicate of soda or potass from the silica (such as is found in the neighbourhood of Farnham or elsewhere); for the purpose of supplying a natural deficiency in most soils, namely, that due proportion of silica in a state of solubility necessary for maintaining heavy crops in an erect position; and by this means the predisposition which all plants have to "lodge," when in a high state of cultivation, is obviated.

The patentee claims, Firstly,—the producing of superphosphate of lime, in the manner and by the means hereinbefore particularly set forth at processes Nos. 1, and 2, and

the use and employment thereof in and for the manufacture of artificial manure, in the manner set forth and described. Secondly,—the mode set forth at process No. 3, of manufacturing artificial manure by producing superphosphate of lime compost direct, by the addition thereto of appatites, phosphorolites, coprolites, bones, bone-ash, or any one of them, or a combination of any two or more of such matters or ingredients, and the combining therewith of soluble silica, converted into silicate of soda or potass for the purpose set forth.

To FREDERICK WILLIAM MOWBRAY, *of Bradford, engineer, for improvements in apparatus used in preparing and combing wool and other fibrous materials.*—[Sealed 7th April, 1853.]

THIS invention relates to that class of machines used in preparing and combing wool, where portions of fibre are detached from the feeding means by nipping instruments, and thence taken by a carrying or transferring-comb, by which they are successively laid on to the passing-combs.

The improvements consist, first, in the application of a brush or series of brushes, or series of teeth, arranged to force the fibre into the carrying or transferring-comb, in a curved or straight line, corresponding to that in which the passing-comb is travelling; by which the fibre, taken from the nipping instruments, will be in a position to be more effectually laid on to the passing-combs; and, secondly, this invention relates to the arrangement of the nipping surfaces of the nipping instruments used in such machines, and consists in forming one of such nipping surfaces with two or more ribs, and the other with corresponding grooves lengthwise thereof, in order the better to hold the fibre which is being separated.

In Plate VI., fig. 1, shews a side view, in section, of parts of apparatus, with the improvements applied thereto. *a*, *b*, are the upper and lower nippers of the nipping instrument employed to take the wool or other fibrous material from the gill feeding apparatus; and *c*, is the carrying or transferring-comb employed to take the wool or other fibrous material, at the proper time, from the nipping instrument, and lay it on to passing combs. *d*, are series of points, or it may be a brush, into which the points of the carrying-comb enter, after taking the fibre from between the nipping instruments, so as to cause the fibre to be better pressed into and more securely held by the teeth of the comb *c*; and when the fibre is to be

fed on to a circle of passing-combs, a curved form is given to the teeth or brush *d*, as shewn at fig. 2, corresponding somewhat to that of the circle of combs on to which the fibre is to be laid by the carrier-comb *c*. When the fibre is to be laid on to combs passing in a straight line, the form of the teeth or brush *c*, is made straight.

The patentee remarks that, although he has shewn the teeth or brush *d*, affixed to the nipper *a*, it is not necessary that it should be so, as it may be independent thereof, so long as such tooth or brush surface is arranged or worked to come into position to act against the fibre taken by the carrying-comb, as explained.

The nipping surfaces a^1, and b^1, of the nipping instruments *a*, and *b*, are arranged according to the second part of this invention,—the one surface having two, or, it may be, more than two ribs, and the other having corresponding grooves, by which a better hold of the fibre is obtained than when only one rib or edge has been employed, as heretofore, to act with a groove on such nipping instrument, to take fibre from gill-feeding apparatus, for the purpose of feeding it on to comb-teeth.

The patentee claims, Firstly,—the application of teeth or brush surfaces for the purpose of pressing the wool or other fibre into the carrying or transferring-comb, so that such wool or other fibre may be in a better position to be laid on to the passing combs, as explained. And, Secondly,—forming the nipping surfaces of nipping instruments used to take wool or other fibrous materials from gill-feeding apparatus, to be fed on to comb-teeth, with two or more rows of ribs and corresponding grooves, as explained.

To Charles De Bergue, *of Dowgate Hill, engineer, for improvements in the permanent way of railways, and also in chairs and in sleepers for permanent way.*—[Sealed 19th May, 1853.]

This invention consists, firstly, of an improved mode of securing a rail to a chair (whether of wrought or cast-iron), and the chair to a sleeper, by means of one bolt, screw, or other fastening, and an adjustable clip or holding piece. This improvement may be effected in the manner shewn at figs. 1, and 2, Plate V., in which *a*, is part of a transverse sleeper, having an ordinary notched or shouldered chair seat; *b*, a rail; *c*, a cast-iron chair; and *d*, an adjustable clip or holding piece,

for which letters patent were granted to the present patentee, 7th Jan. 1853. *e*, is a bolt, which secures the rail to the chair, and the chair to the sleeper. A sleeper without a notched seat may be employed, if preferred, or wrought-iron chairs (such as those hereafter described), instead of chairs of cast-iron.

Secondly, of an improved mode of securing a rail to a chair (whether of wrought or cast-iron), and the chair to a sleeper, by means of two bolts, screws, or other fastenings placed on one side of the rail, and an adjustable clip or holding piece, or two adjustable clips or holding pieces, if preferred. This improvement may be effected in the manner shewn in longitudinal vertical section, and plan view, at figs. 3, and 4,—in which *f*, is part of a transverse sleeper; *g*, a cast-iron chair, sufficiently broad to serve for a joint chair, if preferred; *c*, the rail; *h*, an adjustable clip-piece, which may be made in two parts, if preferred; *i*, *k*, two bolts for securing the rail to the chair, and the chair to the sleeper. A notched sleeper may be used instead of a plain sleeper, when preferred.

Thirdly, of an improved mode of securing chairs to sleepers, having notched or shouldered chair seats or beds, by means of one bolt, screw, spike, trenail, or other fastening. This improvement may be effected in the manner shewn in figs. 1, and 2; *m*, *m*, being the shoulders of the notched seat, and *m**, the notched seat itself; but any other suitable description of chair may be substituted.

Fourthly, of an improved mode of making chairs with a stud or projection from the under side, to assist in preventing the chair from shifting or moving on the sleeper. This improvement may be effected in the manner shewn by the dotted lines *l*, *l*, in figs. 1, and 2.

Fifthly, of an improved mode of making wrought-iron chairs for permanent way, having bended clips or holders, by setting or bending up the clips or holders, and also setting or bending up shoulders or projections, without turning over or bending back those parts of the metal which form the bended clips or holders and projections. This improvement is shewn in fig. 5, wherein *n*, is a wrought-iron chair; *o*, its set or bent-up clip-holder; and o^1, its set-up shoulder or projection. The remaining parts only serve to illustrate an application of this improvement. Instead of each chair having one clip or holder, as shewn, two or more may be made, if preferred,—the chair being constructed of sufficient width for the purpose.

Sixthly, of an improved mode of making chairs for permanent way with one hole or opening only for receiving one bolt, screw, or other fastening; or with two holes or openings, both

at one end of the chair, for securing the same to a sleeper, and also, when preferred, for securing the rail in or upon such chair. This improvement may be effected in the manner shewn in the figs. 1, 2, and 5, wherein the single hole or opening is shewn, having a single bolt therein; and also in figs. 3, and 4, wherein the two holes or openings are shewn, having two bolts placed therein at one end of the chair, or on one side of the rail when placed therein or thereon.

Seventhly, of an improved mode of making chairs which have a holding clip only, or a holding clip and shoulder, by first rolling a bar of wrought-iron with an upright raised rib or ridge (and also with a smaller rib when a raised shoulder is required), and afterwards bending or setting such upright rib or ridge to an angle, so as to form it into a holding clip. Or by rolling a bar of wrought-iron of such an angular form, and with raised ribs or flanges of such shape, that when the bar is afterwards flattened, one rib or ridge will form an angular holding clip, and the other a raised shoulder; or, when a second rib is not required, the forming a sunk shoulder by a recess, groove, or indentation. These improvements may be effected in the manner shewn in figs. 6, 7, 8, and 9, which are transverse sections of bars of iron, rolled to the required forms, and in which the dotted lines p, shew the raised rib or ridge upright as rolled; and p^1, the same rib or ridge as bent over or set down to an angle, so as to form a holding clip. q, is the raised shoulder, for resisting the adjustable holding clip q^1, shewn in dotted lines; and r, is the sunk shoulder, recess, groove, or indentation, to be used when the raised shoulder is dispensed with; but in such case it will be necessary that the adjustable clip should be formed with a corresponding projection to fit the sunk shoulder, as shewn by r^1, in fig. 7. The angular form of the plate is shewn in fig. 8, and the form of the same plate, when flattened, in fig. 9.

Eighthly, in a particular mode or modes of making cast-iron sleepers (for permanent way), which form both sleeper and chair, and which have the metal so relatively proportioned in the base or bearing surface, which rests upon the ballasting, and in the upper portion, which carries the rail, that the larger portion of the metal forms a base adapted to resist tensile strain, while the smaller portion of the metal forms a seat, at the upper part, of comparatively small size for carrying the rail, but capable of affording a sufficient resistance to compression. The said particular mode or modes consists in so casting or making such sleepers as to adapt them for supporting flat-bottomed or bridge rails, to be secured by the

adjustable clip or holding piece previously mentioned (as patented by the present inventor), and a bolt or bolts; so that the rails may rest upon a raised central disc or annular ring, or upon raised ribs or feathers transversely arranged; leaving the rails unsupported between the opposite sides of the rim, or between the ribs or feathers. This improvement may be effected in the manner shewn in the section and plan views, figs. 10, and 11, in which *s, t, u, v,* is the casting; *s,* being its base, and *t,* its upper part, in the form of an annular rim (which may be a plain disc, if preferred),—the conical part or hoop *u,* being only an intermediate support; and *v, v,* strengthening ribs or feathers, in this case radially disposed. The figures shew the adaptation of a rail, secured by an adjustable clip, as before described; the securing bolt, however, being formed with an eye or a hook, as shewn in figs. 12, and 13, for securing also a cross-tie *x.* But when this, or a tie-bar, as shewn by the dotted lines *y,* is dispensed with, a short bolt only is required. The rail may be of any other suitable form, and secured or held in any other suitable or convenient manner.

A modification of the above is shewn in transverse section and plan view, at figs. 14, and 15; fig. 14, being a section in the line *z, z,* of fig. 15. In this sleeper-chair the strengthening ribs or feathers are disposed transversely and lengthways to the rails, instead of in various directions radially. *s, t, v,* is the casting; *s,* being its base, having a few holes *s*,* in it to lighten it; and *t,* the upper part of the sleeper or the top portions of the ribs or feathers *v*; the transverse ones, or some of them, affording bearing surface for the bottom of the rail or rails to be supported. The sleeper-chair, as represented, is intended for receiving the ends of two rails, but may be made single, if preferred. In the section *h,* is an adjustable wrought-iron clip, to be held down by a bolt or bolts, as before explained; and H, is one of two additional wrought-iron holding clips on the opposite side, to be inserted through holes marked H*, in the plan. One of these latter clips and holes may be dispensed with in the case of a single sleeper-chair, instead of a joint one. Or both may be dispensed with by having two clips cast on to the sleeper itself, as shewn at figs. 16, and 17, (in which *x, x,* are the cast clips or holders referred to), or by casting one such clip in place of two.

To Henry Blake, *of Brighton, railway carriage-builder, for improvements in railway wheels.*—[Sealed 12th April, 1853.]

This invention consists in a new mode of combining wood and metal together in the construction of railway wheels, whereby they are rendered more durable, and consequently less expensive, than the railway wheels hitherto constructed.

In Plate VI., fig. 1, exhibits an elevation of the improved railway wheel; a portion thereof being represented in section to shew the construction of certain parts thereof. Fig. 2, is a transverse and vertical section, taken through the line *a*, *b*, of fig. 1. Figs. 3, and 4, are detached parts hereafter referred to.

a, is the nave of the wheel, which is of cast-iron; *b*, the spokes; and *c*, a rim or felloe. These parts are cast together in one homogeneous mass; or such parts may be connected together by any other of the modes hitherto employed, and in known and common use in the construction of railway wheels. *d*, is a wrought-iron flanged tire, the inner periphery whereof is formed with a recess, as also the outer periphery of the rim or felloe *c*; and into these recessed parts segments of wood *e*, *e*, are placed, and securely held in the following manner, and by the following means:—The patentee first prepares segments of wood of the desired curvature by turning such segments in a lathe—taking care to keep the grain of the wood in the direction of their length; and between the ends of these segments he places an elastic substance or material known as "kamptulicon;" and having arranged and disposed such segments of wood around and within the recessed parts of the metal rim or felloe *c*, and interposed pieces of the aforesaid kamptulicon between the ends of such segments, he then passes a wrought-iron hoop of metal *g*, in a cold state, around such segments, and connects the same temporarily to the segments *e*, by passing screws through the ends of the hoop. In order to allow the hoop *g*, to contract, as the segments are compressed, he cuts or divides the hoop, as at *z*, fig. 3; and having tightened the nuts *b*, upon the screw-bolts *a*, and compressed the segments *e*, as much as possible, by hand, he shrinks the wrought-iron flanged tire *d*, thereon, in the manner usually practised in the construction of railway wheels, and securely connects the tire to the other parts of the wheel by passing the bolts *g*, through countersunk holes formed through the tire, the segments *e*, and the rim *c*, as shewn in section at figs. 1, and 2; and he finally secures the bolts to the rim by rivetting.

Thus it will appear manifest, that by tightening the nuts *b*, and shrinking the tire *d*, the wooden segments will be made to converge towards the centre of the wheel: at the same time the kamptulicon, or elastic substance, will be squeezed between the ends of such segments, and thereby prevent them from becoming loose by contraction of the wood or other causes.

The patentee remarks that he prefers to use for the segment pieces the wood known as "sabicu." He claims the use and application of kamptulicon, or other suitable elastic substance, in the construction of the felloes of railway wheels, by placing the same between the ends of the wood segments which compose the felloe, as hereinbefore particularly described and set forth.

To JAMES WORRALL, jun., *of Salford, dyer and finisher, for certain improvements in the method of preparing, treating, and finishing certain textile fabrics, called cords, thicksets, velveteens, and beaverteens.*—[Sealed 30th March, 1853.]

THESE improvements consist, principally, in a certain novel arrangement of some of the several processes hitherto employed, together with the introduction of certain novel processes and apparatus not hitherto employed; by means of which cloth may be gelatinized, stiffened, and dyed, previously to the operations of cutting, raising, backing, or shearing; and, by an improved mode of preparing the goods, the process of flour and lime stiffening, and also that of scouring and cleansing the goods to remove the same, are entirely dispensed with, the principles of tanning are more effectually introduced, and the cloth is thereby rendered much more impervious to wet and moisture; having a "leather finish," or the properties of leather combined with the texture of the cloth and the napped surface.

The various operations employed, and their relative arrangement or order for carrying out this invention, are as follow:—First, the cloth, as taken from the loom, must be "animalized", by "padding on," or otherwise impregnating it with oil, grease, soap, or other fatty matter, and afterwards dried over steam-cylinders, or in a stove. Secondly, the face of the cloth is to be hardened, and afterwards singed or "cantooned," by passing over a red-hot singeing plate. Thirdly, the pieces must be folded upon an apparatus, and suspended inside a steaming-cylinder in such a manner that one piece cannot touch another, or any thing but the apparatus upon which it is folded; being quite free for perfect immersion in the steam

and alkaline ley. The cylinder must be filled with high-pressure steam, which must be allowed to remain therein until the cloth and the whole apparatus is well heated: the steam is then to be shut off, and the cylinder filled with a solution of soap, potash, soda ash, soda, or other alkaline ley. When the cloth has been boiled therein as long as required, it is to be removed, and washed off in pure water, and then all superfluous water removed by means of a mangle, or "hydro-extractor." Fourthly, a strong solution of chloride of lime must be "padded" on the surface of the cloth, which must be then passed through a very weak solution of the same, and the bleaching finished in the usual manner, according to the color required. Fifthly, pad on or pass the cloth through a mordant, composed of gelatine, with a solution of iron, copper, tin, or other suitable metal or mineral, and dry up. Some descriptions of cloth will require the use of an improved apparatus (hereafter particularly described), for more effectually incorporating the gelatine and mordant; that is to say, to fill up all the interstices, and impregnate every fibre of the cloth, in order to produce the best leather finish. This solution, fixed in the cloth at a high pressure, answers for the mordant to fix the color required; and also, by filling the interstices between the threads with gelatine, prepares the same for the tanning process, and serves for the stiffening, previous to cutting or raising the pile or nap, as well as for the "feel" or "handle" required, when finished. Sixthly, dye up the cloth, according to the color required, in a bath containing galls, sumac, catechu, fustic, madder, or other dyes having a strong tanning property combined with their coloring matter; then wash off in a soap ley and dry up. Seventhly, if a cut pile is to be produced, the cloth may be stretched upon a stretching-machine, in order to bring the warp and weft-threads as nearly as possible into their original rectangular position: the pile is then cut in the usual manner,—the back of the cloth having been previously "perched," if a nap is there required. The patentee remarks, that it may be advantageous to some cloth to transpose the seventh operation for the sixth; that is to say, let the stretching and cutting follow the application of the mordant, and the dyeing up that of stretching and cutting. Eighthly, should the cloth require an extra feel or handle, it may be again stiffened at this stage of the process. Ninthly, the pile or nap upon the face and back of the cloth must now be raised or dressed by means of the ordinary raising or dressing machinery,—the superfluous nap upon the face being shorn off by the usual

shearing machinery, according to the finish or appearance required. By this mode of treatment the process of flour and lime-stiffening is dispensed with, as well as the process of scouring and cleansing the cloth to remove the same; and by transposing the process of cutting or raising the pile or nap from one of the earliest operations, and previously to the cloth being dyed, to one of the latest processes, and subsequently to the cloth being dyed or printed, and stiffened for the feel or handle required, the arrangement of the operations or processes is materially improved. By this transposition of the cutting or raising process, a very superior finish is obtained, and the crushed and cloudy appearance of the pile is avoided. By combining the gelatine with the tanning properties of the dyes employed, a cloth, much more impervious to water and moisture, is produced; and, by applying the process of singeing previously to that of cutting, and by dispensing with the process of singeing after cutting, and substituting that of shearing by machinery, more satisfactory results are obtained, and much time and labor is saved in the process of bleaching.

The novel apparatus employed in the fifth of the above-mentioned processes is shewn in sectional elevation in Plate VI. *a, a,* are cisterns for the gelatine and mordant liquors, placed at a considerable elevation, in order to give the requisite pressure; *b, b,* are kiers or vessels for containing the cloth to be impregnated; *c, c,* are hollow or open cylindrical frames, on which the cloth to be operated upon is rolled; and may be wound backwards and forwards as required, by means of the winch-handles *d, d.* The pipes for conveying the gelatine or mordant from the cisterns *a, a,* to the kiers *b, b,* are represented at *e, e;* and *f, f,* are other pipes leading from the upper part of the kiers *b, b,* to the cisterns *a, a.* The kiers *b, b,* are supplied with steam by means of the steam-pipe *g, g.* *h, h,* are man-ways, for convenience of access to the kiers; and *i, i,* are taps for drawing off the gelatine, mordant, &c., from the kiers.

The operation of the apparatus is as follows:—A piece or pieces of cloth being placed in each of the chambers *b, b,* and the man-ways *h, h,* closed, high-pressure steam is admitted into the kiers, by means of the steam-pipe *g, g.* This will have the effect of causing the gelatine or mordant liquor to boil, and also to circulate up the pipes *f, f,* to the cisterns *a, a,* and thence down the pipes *e, e,* back again to the kiers *b, b,* and so on. During this operation the cloth may be wound backwards and forwards as often as is considered necessary,

to impregnate every fibre thereof with the gelatine or mordant liquor. When this operation has been carried on for a sufficient length of time, the cloth may be removed from the apparatus, and passed through a pair of ordinary squeezing rollers, conveniently placed between the kiers, and then dried, in order to prepare it for the next operation.

The patentee claims the improved method of preparing, treating, and finishing certain textile fabrics called cords, thicksets, velveteens, and beaverteens, as above particularly described; especially that of stiffening the cloth by means of gelatine, previously to dyeing; also dyeing and stiffening the same previous to cutting or raising the pile or nap; and the method of producing a "leather finish," by the means hereinbefore more particularly set forth.

To JAMES MAYELSTON, *of Elloughton, in the county of York, Gent., for certain improvements in the manufacture and refining of sugar.*—[Sealed 3rd June, 1853.]

IN carrying out this invention, after the saccharine fluid or solution from which sugar is to be produced, has been duly evaporated and crystallized, the patentee takes the semi-fluid compound of crystals and mother syrups, newly produced by the concentration and crystallization thereof, and, while such compound is in the usual or a fit state for being poured into moulds or other curing vessels, he pours or admits it into a large open vessel (to be hereinafter called the "draining vessel") having, at a few inches above the bottom thereof a perforated false bottom or strainer, covered with wire-gauze, horsehair cloth, or other material, such as shall allow the syrup, but not the crystals, to pass through; but, previously to admitting the said compound into the vessel, he takes care that the shallow space below the strainer shall be filled with syrup or other fluid, in order to resist the premature draining off of the mother syrup. The draining-vessel may be two feet deep, more or less, above the strainer; and, whatever the material of which it is constructed, it should be very rigid in every part; it should be a few inches wider at top than bottom, and the smoother the interior the better. The bottom of the vessel should have a slight descent towards the outlet provided for the escape of the syrup; but the top edges and the false bottom should be set quite level. The false bottom may be conveniently made of narrow battens, with intervals of a quarter of an inch between, and be cross-battened underneath.

The upper battens may be perforated with countersunk holes of three-eighths of an inch diameter, more or less, and an inch, more or less, distant from each other. The end way of the wood should, by preference, be placed towards the longer sides of the vessel, if such there be, and the whole should be held down by screws or otherwise to a ledge round the bottom of the vessel, and likewise supported at proper intervals below. The pneumatic drainer is generally suspended upon gudgeons placed at its ends, nearly opposite to the centre of gravity, with a wheel and pinion for the purpose of inverting and discharging it. It is usually provided with a steam case underneath the bottom, into which steam may be admitted, if requisite, for the purpose of maintaining the fluidity of the mother syrup during its passage out; also, with the means of injecting steam into the space below the false bottom, for the purpose of clearing the strainer occasionally. The space below the false bottom, hereinafter called the syrup-chamber, is connected by means of a cock or valve with a pipe, hereinafter called the exhaust-pipe, which leads to an air-pump or other exhausting apparatus, and also to a close vessel, hereinafter called the receiver, placed lower than the bottom of the draining vessel, for the purpose of intercepting the syrup as it flows towards the air-pump; which receiver is usually provided with the means of heating, in order to maintain the fluidity of the mother syrup when withdrawn, as hereinafter mentioned, in a hot state.

The hot semi-fluid compound having been admitted into the pneumatic drainer, as before mentioned, is left at rest awhile therein, for the crystals to arrange themselves, or so long as the operator may think suitable to the quality of the sugar and the purpose for which it is designed; but before it becomes fixed or consolidated into a mass by cooling, the communication with the exhausting apparatus is opened, and, by means of atmospheric pressure, the mother syrup is gradually withdrawn from the crystals; which operation is continued till the syrup is sufficiently drained off. A barometer is generally connected with the exhausted spaces; and the exhaustion is regulated by a vacuum-valve loaded so as to produce the pressure required from time to time, of which, in practice, the experienced operator will readily judge. The draining being finished, air is drawn copiously through the mass of crystals; for which purpose it is desirable to employ a separate air-pump of large capacity; and this operation is continued till the mass is sufficiently cooled for removal or for further operations, as the case may be. The exhaustion is

then stopped, and the mother syrup withdrawn from the receiver, to be boiled down or otherwise disposed of. If the drained crystals are intended to be sold without further purification, the draining vessel is disconnected from its steam and exhaust pipes; though this may be avoided if the connection be made through the gudgeons upon which the vessel turns, or through pipes made of flexible materials, strengthened internally with a coil or rings of metal. The sugar is then loosened from the sides and bottom, the vessel inverted, and its contents discharged into a truck placed underneath: but if the crystals are to be further purified, the mass is left in the vessel without being loosened, and (as in the usual method of treating sugar when in moulds) the surface is levelled and covered as equally as may be with the ordinary magma of sugar and water; which done, a regulated exhaustion is again produced—beginning gently, until the fluid portion of the magma is drawn into the mass,—and continued according to the judgment of the operator, and followed up during the further processes of washing and blanching the crystals by the usual application of liquors, or any substitute for the same. To assist in judging whether the blanching is complete, with the exhaust pipe is connected a glass tube furnished with a stopcock at either end, into which a sample of the syrup may be admitted from time to time as it flows, and its color ascertained. The crystals being sufficiently blanched, the exhaustion is again increased to its utmost limits, and a copious stream of air is drawn through the mass till it is sufficiently drained and dried, when the exhaustion is stopped and the contents of the vessel discharged. The syrup may be withdrawn from the receiver at any stage of the process, and separated into different qualities, to suit the purpose of the operator. As the mass of crystals in parting with the mother syrup in a warm state is liable to become too porous, especially for the subsequent operation of liquoring, the above process or processes is sometimes varied in the following manner; that is to say:—Soon after the crystals begin to be left bare at top by the draining off of the mother syrup, and while the mass is still warm enough to be compressible, upon its surface is placed a stout wooden cover nearly large enough to touch the sides of the vessel; and over that is laid an air-proof cloth made of or bordered with India-rubber sheeting, some inches larger than the area of the vessel; so that the edges of the sheet shall turn up an inch or two against the sides. Four stiff wooden bars are then placed upon the sheet (one along each edge), and pressed against its turned-up edges by means of clamps or otherwise,

so as to compress the India-rubber against the sides of the vessel, in order to make an air-tight junction all round,—assisting, if needful, with packing, or a luting made by mixing pulverized sugar into a stiff mass with syrup. The exhaustion is then increased by the weight of the atmosphere upon the wooden cover, to compress the mass of crystals,—the stretching of the India-rubber allowing the compression to be followed up in proportion as the syrup is squeezed out below; and this operation is continued till the consolidation is judged to be sufficient, or till no further compression takes place. The covering is then removed, and the rest of the mother syrup withdrawn, by atmospheric pressure admitted between the crystals, as before. Sometimes also the processes are varied by allowing the semi-fluid compound of crystals and mother syrup to cool and consolidate before the removal of the syrup is commenced; and this is sometimes necessary when the sugar is weak and liable to paste from compression.

The processes, as above described, are applicable to the manufacture of sugar intended to be sold in loose or separate crystals. When lump sugar or sugar in moulded shapes is to be made, the process is modified as follows:—Placed within the pneumatic draining vessel, upon or supported a short distance above the false bottom or strainer, are the requisite number of moulds or shapes, which may be entirely open at bottom as well as at top, and of any convenient form, such as that of the frustrum of a cone inverted; but the form which the patentee prefers for the economizing of space is that of a hollow pyramid of six sides inverted, cut off at the lower or smaller end, and entirely open both at top and bottom. He prefers to unite a number of such six-sided moulds into one piece, by casting or otherwise, so as to form a series of hexagonal cells, like those of a honeycomb; the whole number required to fill the vessel being, if needful, divided into convenient sections. The moulds are made just as long as the lumps of sugar are intended to be when finished; and in order to economize space, as little taper is given to them as may be consistent with the ready extraction of the sugar moulded therein, which will depend upon the material of which they are made, and the greater or less smoothness of their inner surfaces. The moulds or cells being arranged, and the chamber below the false bottom filled with syrup, as before-mentioned, the hot and semi-fluid compound, hereinbefore described, is admitted into the vessel till it entirely fills and buries the moulds, and rises three or four inches, more or less, above their tops; so that when the mass of crystals

shall have been shrunk to the full extent by the draining of the mother syrup, and the subsequent washing, there shall still be an inch, more or less, of sugar above the top of the moulds. After waiting a longer or shorter time for the crystals to arrange themselves, or so long as the operator may think suitable to the quality of the sugar, the mother syrup is withdrawn, and the adhering portions thereof are washed away from the crystals by magmas, and liquors applied over the whole surface of the sugar, as if it formed one undivided mass. In operating with moulds the patentee usually begins to withdraw the mother syrup before the crystals become consolidated into a mass by cooling, and in that case he employs the means, hereinbefore described, of compacting the mass of crystals by atmospheric pressure, while still warm and soft enough to be compressible. But he sometimes varies the process by allowing the semi-fluid compound to cool and consolidate before commencing the removal of the mother syrup; especially when the sugar is weak and liable to paste, as hereinbefore mentioned. The masses of crystallized sugar having been sufficiently drained and washed, the superfluous sugar above the tops of the moulds or cells is pared down and removed; the exhaustion is then increased as far as may be,—air being drawn through the interstices of the crystals for the purpose of partially drying them. In order to remove the sugar from the vessel, upon the tops of the moulds (now laid bare by the removal of the surface sugar) a stout wooden cover, large enough nearly to meet the sides of the draining-vessel, is placed, the end of the wood being, by preference, placed towards the two longer sides thereof, if such there be. Against each of these two sides, and extending the whole length of them, a holding-down plate of iron is placed, edgways up, resting in a groove running along the ends of the planks that form the cover; such holding-down plate being broad enough to reach from the cover up to the edge of the vessel, or thereabouts. Some clamps, which are attached by strong chains to the exterior of the vessel, are next brought up, and placed over the upright edges of the holding-down plates, and of the vessels, so as to secure them together; and so that, on the inversion of the vessel, they, and the chains attached to them, may be capable of sustaining the entire weight of its contents, which, on the sugar parting from the vessel, will rest upon them: the vessel is then inverted. Immediately under its mouth, and on a level with the floor below, is a moveable floor or lift, provided with machinery below for raising it when required, and with rails upon its surface for receiving and guiding the

wheels of a truck. Upon this lift a truck, carrying a table, is run. This table is of such dimensions, that, on the rising of the lift, it will enter within the inverted vessel, rise between the holding-down plates before mentioned, and be thereby guided into its ultimate position, when it will press up against the inverted cover. This cover is pierced with holes, so arranged as to coincide with the angles of the moulds, or with portions of their edges; and the table is covered with blunt spikes, standing upright, and corresponding in number and position with the holes in the cover; which blunt spikes are long enough to reach through these holes, and about half an inch beyond the thickness of the cover; but, by the interposition of some loose wedge-pieces, about half an inch thick, between the table and the cover (which are placed upon the table before it is lifted), the blunt spikes are, in the first instance, prevented from passing beyond the thickness of the cover, and only permitted to come in contact with and press against the angles or edges of the inverted moulds. The lift having been raised till the spikes press against the moulds, and the wedge-pieces against the inverted cover, it is to be fixed securely in that position. The clamps being next set free, together with the holding-down plates, the cover now rests solely upon the half-inch wedge-pieces; while the moulds are still supported upon the blunt ends of the spikes. The lift being next lowered, the whole mass of sugar and moulds, together with the cover, become detached from the suspended vessel (which is made with sloping sides to facilitate the separation), and descend along with the table and truck. Should there have been, as hereinbefore recommended, a small space between the false bottom and the moulds, a stratum of sugar, equal thereto, will now cover the ends of the inverted moulds: this stratum is to be cut away, and the lumps or loaves of sugar trimmed neatly level with the edges of their respective moulds. This done, and the loose sugar removed, together with any sugar which is exterior to the mass of moulds, the thin wedge-pieces (which alone support the cover, as before mentioned) are withdrawn, and the cover drops upon the table, leaving a vacancy of half an inch, more or less, below the lumps or loaves of sugar. The loaves of sugar are detached from the moulds by the blows of a mallet or otherwise. When detached the lift is raised, with its whole load, till the moulds again reach their place within the inverted vessel, where they must be temporarily secured by screws or clamps, till the vessel can be turned back to its proper position. The lift is now lowered again. The empty moulds remain suspended in the

vessel, but the truck descends, bearing upon it the table, the cover, and the naked lumps of sugar, which are then wheeled away to be ready for papering. The draining-vessel being then reverted, is ready to receive another charge. If separate moulds are used, they may be stripped from the loaves before the lifting of the truck, and placed in the vessel after it is reverted.

In all the operations, hereinbefore described, it is important that the sugar in the draining-vessel be of equal depth in every part; which, on first filling the vessel, is secured by the level position of the false bottom. In the subsequent manipulations, the edges of the vessel (which are likewise level) may be used, on the principle of the straight-edge, as the means of preserving this equality of depth, by restricting to a uniform depth the edge of any cutting instrument employed in preparing the surface of the sugar for the magmas and liquors; and of any instrument employed for stirring and equalizing the magmas, and mixing the liquors with the loose sugar ploughed up by the cutting instrument.

For the withdrawing of syrup from sugar, by means of the draining-vessel, it is not at all times necessary to employ an air-pump or other exhausting machine, inasmuch as the same effect, practically, may be produced by the descent or sucking action of a column of syrup in a pipe connected with the syrup chamber; the lower extremity of the pipe being recurved, or plunged into a vessel full of syrup by way of water-joint.

In the draining and purifying of sugar, as hereinbefore described, the injury caused by fermentation is greatly diminished, by reason of the shortening of the processes. For a like object the following method or methods of regulating the temperature of saccharine fluids, reserved for use in the manufacture and refining of sugar, are employed; that is to say:—Attached to the vessels containing such fluids is an apparatus which, acting on the well-known principle of the expansion and contraction of materials, or their unequal expansion and contraction, by change of temperature, may, by the contact of such materials with such saccharine fluids, and the expansion or contraction produced thereby, impart motion to, and open, shut, or regulate, any valve or other apparatus, whereby heat is admitted to or excluded from such vessel or such fluid; so as thereby to raise or maintain the temperature of such fluids above the limits at which fermentation is most liable to take place, without exceeding another given limit. (For this purpose it is preferred to maintain the temperature

of any such fluid between 120° and 140° Fahr.) An apparatus, operating in the manner above indicated, the patentee applies to the better preservation of liquors, syrups, sweet or wash-waters, and other saccharine fluids, used or reserved for use in the hereinbefore-described processes, or in any processes of the manufacture and refining of sugar, more especially when such saccharine fluids are unavoidably kept from day to day; and, lastly, it being requisite to use the said liquors at a much lower temperature than 120°, they are cooled as and when they are wanted for immediate use, by means of any convenient refrigerator, which is cooled by a current of cold fluid.

The patentee claims, First,—the employment of atmospheric pressure, induced by exhaustion or suction in vessels with false bottoms, or in moulding apparatus combined or used therewith, as hereinbefore explained, for the purpose of facilitating the draining of the mother syrup from crystals of sugar; which, along with their mother syrup, have been admitted into such vessels or such moulds, when in or about the state in which sugar is usually moulded; that is to say, in a state of sufficient fluidity, whilst hot, to admit of being poured into vessels, and of sufficient consistency to become fixed on cooling; and also for the purpose, when desired, of subsequently washing or liquoring the said crystals in such vessels or moulding apparatus. Secondly,—the suspending of pneumatic draining and cleansing apparatus, in such manner as to admit of being readily inverted, to facilitate the discharging or unloading the same. Thirdly,—the means herein described of retaining saccharine fluids between given degrees of temperature, and thus preventing fermentation in such fluids. Fourthly,—the moulding, draining, and cleansing of sugar by the aid of pneumatic pressure in hexagonal moulds, so united or placed together in one common vessel, or within one common boundary, as to admit of the sugar in them being drained or washed in common.

To Francesco Capeccioni, *of Castle-street, Holborn, for certain improvements in the manufacture of candles.*—[Sealed May 6th, 1853.]

In carrying out this invention the patentee proceeds in the following manner:—Into the melted tallow (but not while boiling) the seven-thousandth parts of acetate of lead is put, and then the mixture is stirred to facilitate the incorporation of the salt with the tallow. After some minutes the heat is lessened; but it must still be sufficient to keep the tallow in a liquid state;

after which the fifteen-thousandth parts of pulverized incense must be thrown into the mixture, and one-thousandth of spirits of turpentine. The same degree of temperature is preserved till the salt is completely dissolved, and the insoluble portions of the incense precipitated, which generally is accomplished in a couple of hours.

The acetate of lead gives to the tallow a degree of hardness superior to that of ordinary tallow: the incense with its soluble part contributes also its increase in hardness, and gives it a sweet smell. The turpentine, modifying the perfume of the incense, makes it very similar to that of wax. The incense and spirits of turpentine give a great brilliancy to the flame.

This process affords the following advantages:—First, the candles do not gutter. Secondly, they have not the disagreeable smell of tallow. Thirdly, they are harder than those of ordinary tallow. Fourthly, they are more lasting than ordinary tallow candles; in fact, they last as long as stearine candles.

The substances above mentioned as being used in this process, may be employed in varied quantities, according to the hardness or smell wished to be attained. Oxides or metallic salts, called astringent or drying salts, which always impart a considerable hardness, may be substituted for the acetate of lead.

Rosins or resinous gums may also be used instead of incense; however, the first-mentioned substances (acetate of lead and incense) are preferable. It is true that resinous or gummo-resinous substances have been before employed in the manufacture of candles,—but they were previously prepared: they have not been employed and combined in their natural state with tallow for making candles. For economy, litharge may be substituted for acetate of lead in the proportion of sixteen-thousandths to a thousand part of tallow. However, when the tallow is thoroughly melted, one eight-thousandth part of acetate of lead, dissolved in hot water, is added; care being taken to pour but a small quantity at a time into the tallow. The mass of tallow should be stirred with a wooden agitator, so as to combine it well with the litharge.

The patentee observes that he does not limit himself to the exact quantities here indicated, though he claims them as being preferable to other proportions. Ordinary wicks may be used or the same as those employed for stearine candles.

He claims the application of the substances herein mentioned, and in the manner herein described, to the manufacture of candles.

To John Hinks *and* George Wells, *of Birmingham, in the county of Warwick, manufacturers and co-partners, for an improvement or improvements in certain kinds of boxes.*—[Sealed 14th April, 1853.]

This invention relates to such kinds of boxes as are usually made of paper, pasteboard, or cardboard, and are used for holding or packing small articles, such as steel or metallic pens, jewellery, &c. When articles made of iron or steel, or other metal, or alloy, capable of rusting or corroding, or articles made of any other substance capable of being otherwise injured by exposure to damp, are kept in boxes made of paper, pasteboard, or cardboard, it frequently happens that much injury arises to the said articles from the moisture which penetrates the said boxes. This is particularly the case with regard to polished steel pens. By the use of this invention, the injury is said to be prevented. The improvement consists in making the top and bottom, or either the top or bottom, of such boxes, of metal, by which means moisture is excluded to an extent sufficient to prevent the same from having an injurious effect. The patentees do not confine themselves to any particular method of making the said boxes, but they usually make them as follows; that is to say:—they make the said top or bottom wholly of sheet metal, turning down (in the case of the tops) or up (in the case of the bottoms) the edges of the said sheet metal: they insert the said edges in the paper, pasteboard, or cardboard sides of the box,—securing the same by paste or other cement. Or they make the said box complete in paper, pasteboard, or cardboard, and cover the top and bottom, or top or bottom, with a thin metallic cover, attaching the same in any convenient manner. It is not necessary to defend the sides of the said boxes with metal, as, from the less surface they expose, as well as from the circumstance that, as ordinarily constructed, they are of double the thickness of the top and bottom, they are therefore much less permeable to moisture.

The patentees do not limit themselves to the use of any particular metal or alloy in carrying this invention into effect, nor to any particular method of applying the same to the tops and bottoms of boxes; but they claim as their invention the addition of metallic tops and bottoms, or metallic tops or bottoms, to boxes made of paper, pasteboard, or cardboard, for the purpose of rendering the said boxes less permeable to moisture, and thereby making them better fitted for the packing or containing of steel pens, and such other articles as are injuriously affected by moisture.

Scientific Notices.

INSTITUTION OF CIVIL ENGINEERS.

January 31st and February 7th, 1854.

The paper read and discussed on these two evenings was "*On the use of the macadamizing system, for the streets of large towns,*" by Mr. Pigott Smith.

In the course of the discussion numerous details were given of the comparative prices of the materials in the country and in the metropolis,—the method of laying them down,—the successive employment of set paving stones in large thoroughfares, then in less frequented streets, and ultimately breaking them up for macadamizing; thus giving the materials an almost unlimited duration. The use of the grit, as collected by the sweeping machines, was admitted to be advantageous for binding the metalling quickly, and preventing the abrasion of the angles of the stones. It was, however, shewn, that the traffic of country towns was so vastly inferior, in amount and weight, to that of the metropolis, especially since the introduction of the heavy railway and other vans, travelling at considerable speed upon comparatively narrow wheels, that a system of forming streets or roads, which would endure well in one case, was not applicable for another,—and hence the present bad condition of Parliament Street and other streets which had been macadamized, and which it was contended could only be maintained, even in their present state, at a cost greatly exceeding that of the paved streets of the City.

The paper next brought under consideration was a "*Description of the navigation and drainage works recently executed on the tidal portion of the River Lee;*" by Mr. N. Beardmore, M. Inst. C. E.

The first part contained a general description of the ancient navigation of the River Lee, and of the gradual improvements introduced into the class of barges frequenting it, and the burthens carried by them. Allusion was made to the difficulties and continual delays which had prevailed, up to a very recent period, in the tidal portion, forming the junction with Bow Creek and the Thames, at Limehouse; difficulties which were aggravated by the navigation being the common supply for five tidal mills.

The new works consisted of stop-gates, across the main channel of the Lee, near Old Ford Lock, established for preventing the water from being drawn down by the tidal mills to the eastward; also a lock for a similar purpose, and to pass barges on St. Thomas's Creek, near Bow Bridge; and a new overfall, to pass surplus water to the three mills.

Three large new flood-gates, each 18 feet in width, were constructed near four mills, with a new tidal lock adjacent to the spot, in order to pass vessels into Bow Creek; the ancient system, to pass craft by a single pair of gates, being only available by drawing down the head water; and frequently, during neap tides, the water did not rise high enough to enable the gates to be opened at all.

The remaining new works consisted of a lock at the east end of the Limehouse Cut, to retain the water; when, in consequence of floods, the Bromley flood-gates were required to be opened; the lock being of such a width as to allow vessels of 21 feet beam to enter the cut; the former lock being only capable of admitting barges of 13 feet 6 inches beam.

In consequence of the treacherous nature of the material at the Bromley end of the Limehouse cut, it was necessary to re-excavate the cut,—to give flatter slopes, and also to build retaining walls of Kentish rag, for the towing path.

The paper concluded by alluding to other considerable works which had been recently executed, at the lower end of the navigation, where it formed a junction with the Regent's canal basin, thus giving access to Armstrong's hydraulic coal lifts and cranes, with the dock conveniences and the wider locks recently executed by Mr. W. Radford for the Regent's Canal Company.

February 14th, 1854.

The paper read was "*On the principles and construction of locks;*" by Mr. A. C. Hobbs, Assoc. Inst. C. E.

The author's object was to give a brief review of the mechanical principles involved in the construction of locks, and the degree of security hitherto achieved by manufacturers.

The paper commenced by asserting, as an axiom, that the highest point of security to be attained in the construction of locks, must consist in the fact, that the possibility of picking or opening them without their true keys, should depend entirely on chance; and that notwithstanding the immense variety of locks already invented, there were really but three absolutely distinct principles involved in their construction,—so classed without reference to dates and for convenience of description.

The first principle included all locks having a series of fixed obstructions or wards in and about the key-hole, to prevent any instrument, except the key, being turned in the lock: this principle was shewn to be inefficient, however complicated the construction might be, as the wards themselves afforded the means of ascertaining the form of key required to open the lock.

The second principle was that of the letter or puzzle lock, which appeared to carry out the principle or doctrine of chance to the fullest possible extent. But in this case, also, a method

was shewn, by which the lock could be opened as easily as in the former; proving, that the inventor of that class of lock had failed to accomplish the object of producing a fastening whose security was dependent only on mere chance.

The third principle or last class of locks included all those possessing a series of moveable pieces called slides, pins, tumblers, &c., placed within the case of the lock, and which pieces must be operated upon and moved into certain given positions, by a key, before the bolt could be shot. This principle was illustrated by descriptions of the Egyptian lock, the Bramah lock, the inventions of Barron and of Bird, the Detector of Mitchell and Lawton, and the later improvements of Chubb, and of Cotterill of Birmingham, and others. Allusion was then made to the great reliance which, until recently, had been placed on these locks; and an explanation was given of the principle on which all locks of this description could be as easily picked as their predecessors.

The author then commented on the necessity of devising some simple and effective means, by which the defect common to all the above locks might be remedied, without adding materially to the cost. This desideratum he had endeavoured to secure by the introduction of what was called a moveable stump, which projection, instead of being rivetted into the bolt, was fixed to a piece moving upon a centre pin at the back of the bolt. The action of that piece was such as to render it impossible to ascertain the true position of the tumblers; for, on any pressure being applied to the lock for that purpose, the stump, by its motion, locked the bolt, and left the tumblers at perfect liberty. The author stated his conviction, that this apparently slight alteration rendered it impossible to open such a lock, except by the mere chance or accident of a key fitting it; there being no possible means of ascertaining the form of key requisite to open it surreptitiously. Since the introduction of this lock, several attempts had been made to produce the same result, without actually copying the original, but with very little success.

An additional principle of security, devised in America, was then pointed out, in the celebrated permutating bank lock, invented by Robert Newell, of the firm of Day and Newell (New York), of which invention Mr. Hobbs was the proprietor in this country. Previous to the introduction of that system, permutating keys had been used, but they required that the lock itself should be altered, to suit any new adjustment of the bits of the key; whereas, in the American lock, the key alone, being altered, produced by its own action the corresponding arrangement in the lock. By this ingenious contrivance, the person using the lock became his own lock-maker, and was able to render the key useless to any other person, by a simple change in the bits, after locking the door. Such locks, whose numbers of permutations varied from 720 to 479,001,600, according to the number of bits

in the key, were intended principally for strong rooms of banks, and other establishments where large amounts of property were deposited; they were, therefore, comparatively expensive, and were necessarily of larger size than locks required for ordinary use.

In conclusion, it was remarked, that questions would continually arise, as to the violability, or inviolability of particular locks, and especially of new inventions. The author, however, claimed to have established, that any new modification or arrangement of the parts of locks which did not affect the principle of construction, could have no particular claim to security; or conversely, that if it could be shewn, that any lock was constructed on a principle not hitherto violated, it might be deemed secure; but certainly not unless such a claim could be made good. In respect to the locks alluded to in the paper, the author justified his statements by the two facts,—that he had not only elucidated the principles on which all such locks might be picked, but that he had actually performed all that had been described. Finally, a hope was expressed, that whatever had been done and said to enlighten the public as to the insecurity of many locks now in use, instead of causing any unpleasant personal feelings, would stimulate lock manufacturers to produce what was really required, viz., secure locks,—adapted to all purposes,—of good workmanship,—and at a moderate price.

February 21st 1854.

The evening was devoted to the discussion of MR. A. C. HOBBS' paper "*On the principles and construction of locks.*

A succinct description was given of the various recent modifications generally introduced by makers of locks, and it was argued, that most of them were simply alterations of form, without materially adding to the security. An exception might, perhaps, be made in favor of Mr. Denison's lock; which was so constructed, that the bolt was shot by turning a handle, without the intervention of a key, which in fact was only used for placing the tumblers in a proper position to allow the bolt to be withdrawn or unlocked by the handle,—the key-hole being kept closed during the passage of the bolt. The key might, therefore, be always retained in the possession of one person; whilst the lock could be closed by any subordinate: this was important in banks and other similar establishments.

The principle of the bolts being shot by a handle was not new, but the other arrangements were admitted to possess novelty.

Mr. Whishaw's electro-magnetic lock, now exhibiting at the Polytechnic Institution, was explained, but was admitted not to be applicable to all the ordinary uses for locks.

The principle of Mr. Cotterill's "patent climax detector lock"

was then examined, and it was shewn to be entirely based upon the Bramah lock, but was less secure in its arrangement, inasmuch as the form of the key admitted of so little variation in the depth of the grooves for moving the slides, that a lock, having six slides, might be opened by the end pressure of a piece of soft wood,—and that any lock on that principle, with any number of slides, could be easily picked by the pressure system.

It was explained, that the American permutating lock, which had been so fully described in the paper, was not intended for ordinary domestic purposes, but for banks and establishments requiring extreme precautions for security; and that the chief object in the introduction of Hobbs' moveable stump or protector lock was to supply a secure lock at a moderate price.

In the course of manufacturing, as might be naturally supposed, the weak points of this lock had not escaped detection, and it was soon discovered that, although the principle was correct, as long as the stump remained moveable, if, by any means, the stump could be held fast, the lock became one of the ordinary tumbler locks, and was as easily picked as the others. For instance, in a till or drawer lock, where the key-hole was parallel to the bolt, it was easy, by the insertion of a piece of watch-spring, beneath the lock, to catch, and hold the stump, and to open the lock. This, however, was readily prevented by the insertion of a tongue in the back plate, fitting into a corresponding groove in the back of the bolt; thus cutting off all access to the moveable piece under the bolt; and further, to preclude access to the stump itself, a piece of steel was rivetted into the front plate, reaching through the tumblers into a groove in the bolt; whereby an effectual barrier was placed between the key-hole and the stump. With these slight additions, which were now introduced, it was contended that locks constructed on the principle of the moveable stump might be considered secure.

It was shewn that Mr. Goater, who was connected with the establishment of Mr. Chubb, had succeeded, very ingeniously, in picking three of Hobbs' till locks, by the means which had been described; those locks, however, not having the additions for security which had been alluded to.

This opening of these locks was admitted to be perfectly legitimate,—shewing slight defects in the details of construction; but demonstrating the correctness of the principle; and it was argued, that it was only by such means that the manufacture of locks could be tested and improved. Indeed, that the lockmakers were greatly indebted to Mr. Hobbs, for shewing them the weak points of the locks constructed prior to 1851.

The manufacture of locks, in this mechanical country, had hitherto been conducted in the rudest manner, and with the most primitive tools; and whilst the price of common and insecure locks was incredibly low, that of locks of good construction was much too high, to introduce them into general use. It was, therefore,

the object of Mr. Hobbs, by the employment of good machinery, to produce locks of uniformly correct construction, on sound principles, and at such a modified scale of prices, as would insure their general adoption; being assured that whoever might be the maker, the most secure locks, at the lowest price, would eventually take the lead with the public.

INSTITUTION OF MECHANICAL ENGINEERS, BIRMINGHAM.

[*Continued from page* 144.]

The following paper, by Mr. S. Lloyd, jun., of Wednesbury, was read:—"*On an improved turn-table.*"

In the construction of turn-tables three leading principles have been followed: either the bearing has been on the centre only, with no bearings at the circumference, or with bearings at the circumference and none at the centre; or a combination of these two modes has been adopted, by allowing the weight to rest in part upon the centre, and in part upon the bearings or rollers at the circumference: this last construction has been most frequently adopted. Most of the turn-tables first laid down on railways were made to rest on fixed rollers, for the sake of economy; but although fixed roller turn-tables are the cheapest kind in first cost, and were much used on the first railways made, live roller tables have been generally adopted latterly, from the greater ease with which they turn;—as in the fixed roller turn-table the weight bears on the axle of the roller, producing rubbing friction; but in the live roller table it bears upon the circumference of the roller, producing only a rolling action without any rubbing friction, except in the guiding ring. Some fixed roller turn-tables have, however, of late been constructed with much larger rollers than those formerly used, which has the effect of perceptibly lessening the friction; but these tables seldom continue long in good working order, in consequence of the rollers indenting the top table. This is an objection to which all roller turn-tables are subject, but those with fixed rollers most especially, from the top table always resting upon the rollers in these, in the same position; thus receiving the pressure always on the same points; and as the amount of surface in contact between them is very small, the whole amount of surface in contact between the surface of the rollers and the top table being not more than three square inches, as shewn, if so much, the rollers soon wound the under surface of the top table, so that the latter became indented over every roller. As soon as this takes place, considerably more power has to be exerted to turn carriages upon them, as the resistance to be

overcome is greatly increased by the whole weight having to be lifted out of each of the hollows formed from the above cause.

But in addition to the increase of friction occasioned by these indentations, they cause also great unsteadiness, making the table rock, and thus clatter and hammer against the rollers as each pair of wheels passes on and off its two opposite sides. This deteriorating action goes on to a greater or less extent in almost all roller tables; often occasioning the top to break, if it is not very strongly made: this rocking is often greatly increased, and occasionally entirely originates from the centre-pin being too tightly screwed down, so as to take the weight entirely off the rollers on one side of the table.

This defect has led to the construction of turn-tables with a centre-pin that acts merely as a centre guide, without taking any weight. Turn-tables of this class, if made with radiating rollers, have the advantage of remaining very solid for a time after they are put in; but frequently this is not of long continuance, for all roller turn-tables are unsteady, if the rollers are not all correctly turned to the same diameter, and cottered or screwed up exactly to the same distance from the centre. Each roller being a portion of a cone, its outside diameter is greater than its inside, and if either of the rollers is screwed up too tightly the table rides on it. This is sometimes occasioned after a few months' wear, by the pressure of the table top continually exerting a force tending to drive the rollers upon which it rests outwards, which is sure to be the effect if either of the nuts that screw them up becomes slack. This pressure tending to force the rollers off the roller-path, causes considerable friction against the guide ring at the boss of every roller, and is one cause of the heaviness with which even live roller turn-tables work,—causing railway labourers in goods stations, whenever they have the chance, to wrench them round by horse-power.

In an improved construction of roller turn-tables, extensively adopted, the weight of the table top is nearly counterbalanced by a weighted lever, which constantly tends to lift the centre-pin without actually doing so,—making the table much easier to turn, by diminishing proportionately the pressure on the rollers. The rollers also are not fixed as in common turn-tables, but in an inclined position with their upper surfaces level, for the purpose of preventing the level of the table top from being disturbed by the surge of carriages passing over. In some turn-tables the rollers have been made with rounded edges, with the view of lessening the friction of turning, and increasing the steadiness of the table, by resting it on a plane instead of a cone; but these rollers have not been found to be durable, and the roller-path becomes worn hollow by them. A more successful plan for diminishing the friction has been the use of spherical balls instead of rollers, travelling round in a live ring, to prevent the balls from rolling

off, but allowing them room to shift their position on the roller-path as they move round, which prevents them from wearing the roller-path into grooves; and as the balls travel in a circle, sometimes in one direction and sometimes in the contrary direction, they continually present a fresh portion of their surface for the bearing, which preserves them from being worn unequally.

There is one objection to these tables, but which applies still more strongly to roller turn-tables, namely, the extreme difficulty of turning them in frosty weather, when the dirt on the rollers and roller-paths becomes frozen. Horse-power is then often required to stir them, or a fire has to be lighted to thaw the congealed mud collected on them.

Centre bearing turn-tables are practically free from this objection, and also from the one before referred to; namely, the bearing surface becoming indented, from the small extent of surface in contact with the rollers. A turn-table of this class has its whole weight carried by the centre pivot or ball; any side pressure resulting from the weight to be turned not being balanced exactly upon the centre, being carried by two sets of horizontal rollers, that travel with the top table round the centre pillar, and are fixed to a jacket that encircles the pillar.

This description of turn-table has two important advantages:—Great ease in turning and smoothness of motion, and great durability; numbers of them having continued in use for many years without requiring any repairs. The ease with which they turn is owing to the great leverage obtained by the power being applied at the circumference of the table, and to the resistance being confined to the centre ball and the rollers round the centre pillar, instead of being at the circumference, as in roller tables, in which it acts at nearly as great a leverage as the power. So that, while no leverage is obtained when the power is applied in turning a carriage at the outer edge of a roller table, a leverage of 14 to 1 is gained in a centre bearing turn-table, even if half the resistance be supposed to take place at the horizontal rollers, and only half at the centre pin.

Centre-bearing turn-tables, as usually constructed, have, most of them, two defects; namely,—great extra cost of foundations, and unsteadiness, and liability to deflect: the last being the most serious defect, which renders them objectionable for any situation where much traffic is likely to pass over them,—their deflection, upon trains passing over them, being caused by the whole of the weight of each carriage acting at a great leverage to strain the working parts of the table while running on and off. To meet this defect, a number of supplementary rollers has usually been fixed at the circumference, for the purpose of catching the weight and preventing any undue deflection when the weight is passing on and off the edge of the table; these rollers being fixed a little below the level of the table-top, so as not to touch the top and

come into action until the top gives way by deflection, or by canting on one side. This plan has, however, the objection of being unmechanical; as it implies a certain degree of failure in the machine before it can come into full operation.

The unsteadiness of the centre-bearing turn-tables, described above, may be considered as the principal cause of their disuse, notwithstanding their superiority over roller-tables in ease of turning;—another cause being the expense and depth of the foundations requisite. The object of the present paper is to describe an improved plan of construction that will remove these defects.

The action of this turn-table is as follows:—The centre pillar is fixed on a block of stone or other suitable foundation, within which a toggle-joint or other lever, connected with the centre pin, is secured: by means of this the turn-table is raised when wanted for use. The weight, when the turn-table is not in use, is all carried by a ring at the periphery of the table, and none upon the centre pin. By this means the table is made quite steady and solid, and not likely to be injured by trains passing over it; whereas, as soon as the centre pin or pivot is made to rise by the lever, which is worked into this position by means of a rod connecting it with another lever or toggle-joint, forming one of the catches of the table, the turn-table-top is raised off the outer ring, and may be turned with great facility,—the weight then resting entirely on the centre pin or pivot.

Provision is made, as in other centre-bearing tables, for the weight of the table not being equally poised on the centre, by horizontal rollers, which carry the side pressure, and serve, by their contact with the centre pillar, to preserve the turn-table in a level position while rising and in use. When the turn-table is no longer required, it is again made solid by the handle of the lever, which forms one of the catches, being lowered into its original position.

The author describes another mode of constructing turn-tables, by which the same result is obtained of supporting the table-top by its circumference when out of use, and upon its centre when in use. The action of the lever in this table is merely to raise the table sufficiently to disengage the blocks. When the table is not in use, the lever is at its lowest position; but, as soon as it is necessary to turn a carriage, the table-top is eased off the four blocks at the circumference, under the main line rails, by being raised from $\frac{1}{4}$ to $\frac{3}{8}$ths of an inch, by the action of a knuckle-joint lever, placed in the hollow of the centre pin. By this time the stud, which is fixed upon the long lever, having traversed to the end of the slot in which it works, carries a short rod with it, and withdraws the four blocks from under the outer ring. The long lever is now at the bottom of its stroke; and the centre joint of the knuckle-joint lever has now passed from one side of the centre

line of the table to the other. The table-top is exactly at the same level, when the long lever is at the bottom of its throw, as when it is at its top; the difference being, that when the long lever is up, the table-top is supported entirely at its circumference on the four blocks, which may be made of any convenient size; and while it is down, the weight is on the centre pin, when carriages may be turned with ease and rapidity. By means of the stud traversing the slot in the short rod upon the long lever during the first part of the motion, the table-top is eased off the bearing on the blocks before the short rod is set in motion to withdraw the blocks: and by the same means, in lowering the table, time is allowed for the blocks to be pushed home before the table-top is lowered upon them; so that the blocks are relieved from the weight whilst they are being moved. At the end of the long lever a weight is fixed, to balance the weight of the table-top to within a few cwts.; the balance-weight not being made heavy enough to raise the table-top without the exertion of a slight pressure on the handle of the lever. Other modifications of this improved table might be described; but, as the principle in them all is the same, viz.,—to carry the weight upon the centre pin when the table is being used, and upon the circumference when not in use, it is not necessary in the present paper to do so.

In answer to an enquiry from Mr. Woodhouse, Mr. Lloyd replied that none of the plans with the lever had been put to work yet,—the first one was not yet ready for trial; but a considerable number (about 60) of the first plan, without the lever, were at work very satisfactorily, many of them on the Syston and Peterborough line. They answered very well for goods stations, but not for the main line, because they deflected too much at the outer edge for trains to run over them. They were found to keep in order very well; and some of them had been 10 years at work.

Mr. Gibbons thought there might be found a difficulty in getting the blocks to slide in always to their plates under the table-top, in the proposed lifting table.

Mr. Lloyd observed, that there was only about 1 cwt. left unbalanced of the weight of the table-top; so that there was very little work for the lever to do in lifting the top to the extent that was required for liberating the blocks, and pushing them into their places again. The whole weight of the top might be 3 tons for a 12-feet table, but it was nearly all balanced by the weighted lever; so that little more than the friction had to be overcome in lifting the top. The table was not lifted with a carriage on, as in previous plans of lifting tables, and was only to be lifted in the act of making it solid for the main line to let trains run over it, and in setting it free again; but was not lifted in the process of turning. The table-top was only to be blocked for main-line trains to run over, and was to be left free without supports, at the circumference, when turning, and whilst carriages were pushed on and off the table for turning.

Mr. Cowper thought the height between the upper and lower rollers, where they bore against the centre post, was so small (making a great leverage at the circumference of the table), that a small play in the rollers would cause a considerable deflection at the edge of the table; so that it appeared liable soon to get out of level, with carriages running on and off, if the top were not always blocked solid.

Mr. Lloyd replied, that the rollers at top and bottom had the means of ready adjustment by screws, and no difficulty had been found in the tables at work, though they had no bearing at the circumference; while carriages and waggons were constantly being run on and off for turning. The only injurious deflection arose when trains of carriages passed over them: all those laid down were 12 feet diameter.

Mr. Sampson Lloyd observed, that the centre-post tables were found to have very little wear, and worked quite successfully: some of them had been in work 10 years without any bearing at the circumference: the deep pillar engine-tables had lasted very well for many years. The sliding blocks and lifting motion was a recent invention, for the object of making the table solid in the main line, when trains had to run over.

The following paper, by Mr. JOHN ROLINSON, of Brierley Hill, was then read:—"*On an improved apparatus for preventing explosions of steam-boilers.*"

The object of this apparatus is to provide a self-acting means of closing the stop-valve, and opening the safety-valve, when a boiler is getting short of water; thereby cutting off all communication with the other boilers until the boiler is again properly supplied with water, and causing an alarm to call the attention of the engine-man, before the water has got so low as to risk any injury of the boiler: preventing at the same time any increase of the pressure in the boiler from taking place.

In this boiler the float falls when the water gets low, and closes the stop-valve by a tappet, and opens the safety-valve by a second tappet; thereby causing an alarm by the rush of steam through the escape-pipe, as soon as the water gets down to the level to which the apparatus is adjusted.

In a range of boilers working in connection, it sometimes occurs, from various accidental causes, that one of them becomes low in the water, causing danger of explosion; but with this apparatus such an accident is prevented; and by closing the stop-valve and opening the escape-valve, the boiler is cut off, and prevented from causing accident until properly filled with water again, when it resumes its former position, as the stop-valve then opens again and the escape-valve closes.

The pressure of steam is prevented from ever getting too high in the boiler, by means of a small cylinder, having a piston of one square inch area, which is open to the boiler on the under side, and is loaded on the top of the piston-rod with as many pounds weight as the number of pounds pressure per square inch intended for the limit of the steam pressure. The piston lifts these weights in succession as the pressure rises, and at last lifts the lever of the escape-valve. A space is left between the different weights, so that the piston has to move nearly to the top of the cylinder before it comes to the full pressure; and, by the continual movement of the piston in the cylinder, from the variations of pressure in the boiler, the piston is prevented from sticking fast, and is kept always ready for action.

The escape-valve lever is held up by a spring-catch, if it continues to be lifted beyond a certain point, and then the escape of steam cannot be stopped; and the alarm will continue sounding until the engine-man, returning to his duty, releases the valve lever from the catch, by pulling a handle fixed to the top of the piston-rod.

The whole apparatus is locked up in a cast-iron box; so that the engine-man is unable to increase the steam pressure, or to prevent the sounding of the alarm and the escape of the steam whenever the water level is suffered to get too low, from any cause, or the steam pressure gets too high. The apparatus is connected to the ordinary stop-valve fixed usually on boilers, and requiring only an alteration of the lever.

This apparatus was stated to have been at work, for about two months, at Mr. Benjamin Gibbons' (Corbyn's Hall) new furnaces, near Dudley, and to have proved quite satisfactory. It had been tried fully, by blowing off the water from the boiler down to the level to which the apparatus was adjusted, when it was always found to act completely; and also when the pressure of the steam was raised too high.

Mr. Benjamin Gibbons said that the apparatus described in the paper was applied to one of a set of three boilers at his works, and proved quite satisfactory. It was found to act completely, either whenever the water was too low in the boiler, or the pressure of steam too high; and effectually prevented accident, and it appeared not liable to derangement.

Mr. Downing enquired whether there was the common safety-valve in addition, and what was the size of the escape-valve?

Mr. Rolinson replied, that an extra 5-inch valve was used, besides the ordinary safety-valve. The boiler to which the apparatus had been applied, was 6 feet diameter, and 30 feet long.

Mr. Downing thought the safety-valves were generally too small; and they would be better larger than 4 inches, by giving speedier relief to the boiler.

Mr. Gibbons observed, that the size of safety-valves might be too much increased, as large valves would be more liable to stick fast; and he had never found the usual 4-inch valves not large enough.

Mr. Ramsbottom remarked that a heavy float would be required to insure the action of the apparatus, and it would have to close the stop-valve against the pressure of steam in the boiler.

Mr. Rolinson said the float was made large and heavy to insure certainty of action; but the steam from the other boilers would be always pressing on the top side of the stop-valve; and the pressure in the boiler on the under side of the valve was lowered by the steam being let off directly the apparatus acted.

In answer to a question of the Chairman, Mr. Rolinson replied that the steam was found to make sufficient noise in escaping without the use of a whistle; and there was the advantage of having no obstruction to its discharge.

Mr. Gibbons remarked, that the whole apparatus might be locked up in a case of moderate size, about 3 feet high, including the float-chain and wheel, whereby it would be put entirely out of the control of the men. He added that the whole cost of the apparatus was about £15 or £20.

LIST OF GRANTS OF PROVISIONAL PROTECTION.

1854.

[*Cases in which a full Specification has been deposited.*]

147. Henry Watson, of High-bridge, Newcastle-upon-Tyne, for improvements in water-closets.—[*Dated January* 21*st.*]

252. Francis Herbert Wenham, of Effra Vale Lodge, Brixton, for improvements in fire-arms.—[*Dated February* 1*st.*]

286. Robert James Mary'on, of York-road, Lambeth, for certain improvements in the machinery for the improved construction of windlasses and other machines for which the same invention is applicable.—[*Dated February* 6*th.*]

319. John Taggart, of Massachusetts, for an improved machine for excavating earth.—[*Dated February* 9*th.*]

[*Cases in which a Provisional Specification has been deposited.*]

1853.

2330. Charles Rowley, of Birmingham, for improvements in ornamental dress fastenings.—[*Dated October* 11*th.*]

2468. Marcus Davis, of Cloudesley-square, Islington, for improvements in the treatment of fibrous materials other than flax and hemp,—being a communication.—[*Dated October* 25*th.*]

2595. George Shepherd, of King William-street, for certain improvements in the construction of railways.—[*Dated November 8th.*]

2638. William Anderson, junior, and Alexander Wark Murphy, of Glasgow, for improvements in that class of ornamental fabrics, usually termed "Ayrshire sewed work."—[*Dated October 14th.*]

2689. Auguste Castets, of Paris, for an improved composition for curing diseases in the feet of animals.—[*Dated November 19th.*]

2707. Edward Briggs, of the Castleton Mills, near Rochdale, for improvements in weaving and manufacturing raised pile fabrics, and in machinery employed therein.—[*Dated November 22nd.*]

2773. James Lord, of Farnworth, for improvements in the manufacture of certain articles for ladies' under clothing, and in fabrics for the same.—[*Dated November 28th.*]

2827. Edward Lavender, of Deptford, for improvements in apparatus for subjecting substances to the action of heat, for the purpose of carbonizing, calcining, or combining such substances, or for subjecting such substances to the process of distillation.—[*Dated December 5th.*]

2880. John Henry Johnson, of Lincoln's-inn-fields, for improvements in moulding; more particularly applicable to toothed wheels,—being a commmunication.—[*Dated December 10th.*]

2933. Charles Goodyear, of St. John's Wood, for improvements in the treatment and manufacture of India-rubber,—being partly a communication.—[*Dated December 16th.*]

2964. Archibald Thomson, of Glasgow, for improvements in setting out and marking the rivet holes in the plates used in constructing iron ships, boats, boilers, and other vessels.—[*Dated December 20th.*]

2996. Edward Joseph Hughes, of Manchester, for improvements in sewing-machines,—being a communication.—[*Dated December 27th.*]

3011. Samuel Barnes, of Oldham, for a certain improvement or improvements in the construction of looms.—[*Dated December 28th.*]

3019. James William Crossley, of Brighouse, Halifax, Yorkshire, for improvements in the production of surface finish to certain descriptions of fabrics, composed of worsted, cotton, or silk, or combinations thereof.—[*Dated December 29th.*]

3023. William Pickstone, of Radcliffe, and John Booth, of Pilkington, for improvements in looms for weaving.—[*Dated December 30th.*]

3039. Julian Bernard, of Regent-street, for improvements in stitching and ornamenting various materials, and in machinery and apparatus connected therewith.—[*Dated December 31st.*]

1854.

27. John Mason and Leonard Kaberry, both of Rochdale, for improvements in machinery or apparatus for preparing cotton, wool, and other fibrous materials for spinning.—[*Dated January 5th.*]

37. William Aspden, of Blackburn, for certain improvements in looms for weaving.

39. Anthony Bernhard Baron Von Rathen, of Wells-street, for improvements in chimneys and flues of houses, and in stoves to be employed therewith, whereby better draught will be obtained, consumption of fuel will be diminished, smoke, fog, and night-damp will be prevented from entering apartments, more warmth will be thrown out,—and whereby fire in the chimney can be readily extinguished.

41. John Henry Johnson, of Lincoln's-inn-fields, for improvements in machinery or apparatus for effecting agricultural operations, and in communicating power thereto; parts of the said improvements being applicable to the obtainment of motive power for general purposes,—being a communication.

43. John George Taylor, of Glasgow, for improvements in writing apparatus.

The above bear date January 7th.

45. Benjamin Burleigh, of the Great Northern Railway, King's-cross, for improvements in railway switches and chairs.

47. Richard Albert Tilghman, of Philadelphia, for improvements in treating fatty and oily matters; chiefly applicable to the manufacture of soap, candles, and glycerine.

49. William Garforth and James Garforth, both of Dukinfield, for certain improvements in mechanism or apparatus for retarding or stopping the motion of locomotive engines and other railway carriages.

51. William Taylor, of How Wood, Renfrew, for improvements in furnaces and fireplaces, and in the prevention of smoke.

The above bear date January 9th.

53. William Brown, of Bradford, Yorkshire, for improvements in preparing to be spun, wool and other fibrous material.

55. The Reverend William Renwick Bowditch, of Wakefield, Yorkshire, for improvements in economising fuel, and in the more economical production of light and heat.

57. Elmer Townsend, of Boston, U. S., for improvements in machinery for sewing cloth, leather, or other material,—being a communication.

59. John Ralph Engledue, of Southampton, and Thomas Burningham, of Milbrook, Hants, for improvements in furnaces.

61. William Little Tizard, of Aldgate, for machinery for stamping, crushing, washing, and amalgamating gold and other ores.

The above bear date January 10th.

63. Joseph John William Watson, of Old Kent-road, for improvements in signalling.
64. Henry Bennettsmith, of the parish of St. Sepulchre, for a machine for mowing or reaping all kinds of corn, grass, clovers, or any other field growth and lawns.
65. Daniel Semple, of Aden, Arabia, for an improved guide for the finger-boards of musical stringed instruments.
67. Felix Lieven Bauwens, of Pimlico, for improvements in treating fatty matters, previous to their being employed in the manufacture of candles.
69. Ralph Lister, of Scotswood, for improvements in distilling apparatus.
71. Henry Beaumont Leeson, of Greenwich, for improvements in gas-burners.
73. Antoine Ponçon, of Marseille, for obtaining a motive power.

The above bear date January 11th.

74. John William Wrey, of Upper Berkley-street West, for a new and improved method of transmitting motion.
75. Thomas Waller, of Ratcliff, for improvements in register-stoves and other stoves or fire-places.
76. Thomas Edwin Moore, of St. Mary-le-bone, for improvements in apparatus to be used for extinguishing fires.
78. John Fuller Boake, of Dublin, for improvements in and applicable to certain lamps or lanterns, so that either candles or oil may be used therein with facility.
79. John William Partridge, of Birmingham, for certain improvements in the manufacture of soap.
80. John Bethell, of Parliament-street, for improvements in manufacturing coke.
81. Leon Joseph Anger, of Paris, for improvements in the manufacture of metallic tubing.
82. Thomas Frederick Henley, of Cambridge-street, Pimlico, for improvements in the preparation of certain coloring materials.
83. Auguste Edouard Loradoux Bellford, of Castle-street, for an improvement in the manufacture of glass,—being a communication.
84. Samuel Wilkes, of Wolverhampton, for improvements in the construction of chairs and rails for railways.
85. John Henry Johnson, of Lincoln's-inn-fields, for improvements in the preparation of glycerine and in its applications,—being a communication.
86. Robert Maclaren, of Glasgow, for improvements in moulding or shaping metals.

The above bear date January 12th.

88. Arthur Parsey, of Crescent-place, Burton-crescent, for improvements in machinery for obtaining and applying motive power by means of compressed air and other fluids.

89. Patrick O'Malley, of Dublin, for the manufacture of a new drink or beverage from certain vegetable and other substances, and the conversion thereof into vinegar.
90. Thomas Bennett Foulkes, of the city of Chester, for improvements in the manufacture of self-adjusting gloves.
91. John Wilkinson, of Manchester, for improvements in the manufacture of dies for producing printing surfaces for calico printers, applicable also to embossing.

The above bear date January 13th.

87. William Eassie, of Gloucester, for improvements in trucks used on railways.
92. James Newman and Henry Jenkins, both of Birmingham, for improvements in the manufacture of spoons, table forks, and other articles.
93. James Bird, of Saint Martin's-lane, for an improvement in taps and cocks.
94. Julius Jeffreys, of Carlton-villas, Maida Vale, for improvements in the manufacture of mineral charcoal and coke, and in adapting open grates for the combustion of them.
95. Arthur Dobson, of Bolton-le-Moors, for certain improvements in looms for weaving.

The above bear date January 14th.

96. Charles Frederick Stansbury, of Cornhill, for a new and improved mode of propelling machinery,—being a communication.
97. William Crosskill, of Beverley, Yorkshire, for improvements in the construction of portable railways.
98. James Newall, of Bury, for improvements in machinery or apparatus for stopping or retarding the progress of railway and other carriages, and in the mode or method of connecting two or more carriages with the said apparatus together.
99. Philip Grant, of Manchester, for an improved roller used in the processes of letter-press, copper-plate, and lithographic printing.
100. Peter Blaker, of Crayford, and William Wood, of Chancery-lane, London, for a machine for crushing coal and the refuse arising from the combustion of coal used for brick-making and other purposes.
101. George Fergusson Wilson, of Belmont, Vauxhall, for an improvement in the manufacture of candles and night lights.
103. Penrose Goodchild Julyan, of Bath-street, Birmingham, for improvements in communicating signals to engineers, guards, and others, in a moving railway train.
104. Joseph Spires, of Lower Drummond-street, Euston-square, for improvements applicable to boots and shoes.

The above bear date January 16th.

106. William Brown, of Camberwell, for improvements in printing machinery.
107. William Crosskill, of Beverley, for an improvement in the construction of carriage wheels to run on railways and ordinary roads.
108. Edward Highton, of Regent's-Park, for improvements in suspending the wires of electric telegraphs.
109. Henry Holland, of Birmingham, for certain improvements in the construction of parts of umbrellas and parasols.
110. Robert Maclaren, of Glasgow, for improvements in moulding or shaping metals.
111. Henry Corlett, of Summer Hill, Dublin, for improvements in springs for railway and other carriages and vehicles.
112. Karl Weber, of Rechtberg, Würtemberg, for improvements in the manufacture of boots and shoes.
113. Bevan George Sloper, of London, for improvements in machinery or apparatus for separating gold from earthy matters.

The above bear date January 17th.

114. William Blackett Haigh, of Oldham, for improvements in machinery or apparatus for tenoning, mortising, slotting, cutting, or shaping wood or metal.
115. Edward Lord, of Todmorden, for certain improvements in looms for weaving.
117. Charles Staunton Cahill, of Greenwich, for improvements in submarine, subterranean, and other electric and magnetic telegraphs, and in insulating, laying down, joining, and covering the same.
118. William Batten, of Westbourne-street, Pimlico, for an improvement in the construction of a sink, drain, or gulley-trap named the self-acting effluvium-trap, for the more effectual conveyance of all liquids or admixtures in passing into drains, sewers, cesspools, or other receptacles, and the better prevention and exclusion of all vapours, effluvia, or gases arising therefrom.
119. Walter Greenshields, of Edinburgh, for improvements in chenille fabrics.
120. William Thomas, of Cheapside, for improvements in stays.
121. Edmund Sharpe, of Swadlincote Potteries, near Burton-on-Trent, for improvements in the apparatus used for sifting clay.
122. Charles Howard, of Trafalgar-terrace, Hoxton, for improvements in the manufacture of iron.
125. Jean Pierre Bourquin, of Newman-street, for improvements in or applicable to troughs or vessels for holding liquid substances required in the art of photography.

The above bear date January 18th.

126. George Henry Bursill, of Offord-road, Barnsbury-park, for improvements in operating upon metalliferous ores and other minerals, and upon "slags" and "sweep," in order to facilitate the separation and recovery of the metals and other products; also in machinery or apparatus for effecting such improvements, which is in part applicable to other purposes.
128. Alexander Dalgety, of Florence-road, Deptford, for a new construction of rotatory engines or pumps.
129. John Norton, of Cork, for improvements in effecting communications between the different parts of railway trains.
130. Thomas Webb, of the Platts Glass Works, Stourbridge, for improved apparatus applicable to the annealing of glass and the firing of pottery ware.
131. Heloise Guyon, of Paris, for improvements in the manufacture of bread.
132. Henry Brownentt, of Liverpool, for treating scrap and waste iron, so as to render the same more readily available in the manufacture of iron.
133. Francis Parkes, of Sutton Coldfield, for a mode or method of fixing tools and implements in helves or handles.
134. Nehemiah Hunt, of Massachusetts, for improvements in machinery for sewing cloth or other material,—being a communication.
135. Charles William Rowley Rickard, of Great Charlotte-street, Blackfriars-road, for improvements in cocks and taps.

The above bear date January 19th.

136. Henry Dircks, of Moorgate-street, for improvements in safety apparatus applicable to certain boilers and stills.
137. Henry Bollmann Condy, of Battersea, for improvements in the manufacture of sulphate of soda, sulphate of potash, and other sulphates, and in the manufacture and employment of muriatic acid.
138. Edward Aitchison, of Manor-street, Chelsea, for improvements in apparatus for fixing, removing, and plugging tubes of tubular steam-boilers.
139. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in cutting out cloth and other fabrics and materials suitable for garments and furniture,—being a communication.
140. Oliver Rice Chase, of Boston, U.S. for pulverizing machinery.
141. James John Field, of Charles-terrace, for improvements applicable to guns, cannon, or ordnance, rifles, and other similar implements of war or the chase, for more accurately aiming at the object to be struck by projectiles.
142. Robert Angus Smith and Alexander Mc Dougall, both of Manchester, for improvements in treating, deodorizing, and disinfecting sewage and other offensive matter; which said

improvements are also applicable to deodorizing and disinfecting in general.

143. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in the manufacture of stays or corsets,—being a communication.

The above bear date January 20th.

144. Richard Roberts, of Manchester, for certain improvements in machinery for cutting paper, pasteboard, leather, cloth, and other materials.

146. Marie Louise Lise Beaudeloux, of Paris, for a candlestick working by machinery, so as to keep the candle always at the same height in a tube, with a shade of a peculiar construction, so as to augment greatly the quantity of light.

148. George Grace and Thomas Francis Jones, both of Birmingham, for improvements in boots and shoes, as also boot and shoe socks or inner soles, whereby the same are rendered waterproof.

149. John Westerton, of Earl's-court-road, Brompton, for an improvement in the manufacture of night-light boxes or cases.

150. Cyprien Marie Tessié du Motay, of Paris, for improvements in the manufacture of oil from rosin.

151. Herman Eugene Falk, of Gateacre-house, Liverpool, for improvements in preparing or manufacturing salt.

152. Thomas Boulton Venables, of Burslem, for certain improvements in the manufacture of earthenware.

153. Peter Spence, of Pendleton, for improvements in manufacturing the prussiates of potash and soda.

154. Daniel Warren, of Exmouth, for improvements in raising, pumping, or forcing water.

155. Charles John Edwards, of Great Sutton-street, for improvements in the manufacture of bands for driving machinery.

The above bear date January 21st.

156. Andrew Shanks, of Robert-street, Adelphi, for certain improvements in machinery for punching and shearing metals.

157. Charles Clarke Armstrong and William Pursall, both of Birmingham, for a new or improved percussion cap.

158. William Darling, of Edinburgh, for improvements in sewing-machines, —being a communication.

160. Thomas Robinson, of Farringdon-street, for improvements in apparatus for filtering volatile liquids.

161. Matthew Andrew Muir, of Glasgow, for improvements in weaving.

162. John Lockhart, jun., of Paisley, for improvements in the manufacture of bobbins.

163. John George Taylor, of Glasgow, for improvements in treating the fleeces or natural coverings of sheep and other animals when on the animals.

164. John George Taylor, of Glasgow, for improvements in lamps and in substances to be burned therein.

165. Henry Seebohm, of Esholt, near Leeds, for improvements in combing wool, goats' hair, Alpaca, cotton, and other fibrous material.

166. John Getty, of Liverpool, for improvements in the manufacture of tubular bridges; part of which improvements is applicable also to the preparation of plates for covering iron ships, for constructing boilers, and for other analogous uses.

167. John Westlake, of Totnes, for pulverizing, washing, separating, amalgamating, and otherwise treating ores, gossans, earths, and rocks, so as the better to obtain and extract therefrom the gold and other metals and minerals which may be contained therein.

168. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in machinery for bending metal and producing forms thereon by pressure,—being a communication.

169. Jean Marie Julien Louis Bouvet, of Paris, for certain improvements in kneading machines.

171. Richard Archibald Brooman, of Fleet-street, for improvements in machinery for sawing stone and marble,—being a communication.

172. Richard Archibald Brooman, of Fleet-street, for improvements in extracting copper from the ore,—a communication.

173. Adolphus Theodore Wagner, of Berlin, for a psychograph or apparatus for indicating persons' thoughts by the agency of nervous electricity.

The above bear date January 23rd.

174. Adderley Willcocks Sleigh, of Weymouth-street, Portland-place, for creating a continual self-acting, self-sustaining new motive power, applicable to every purpose requiring speed, motion, and power, together or separately.

175. George Williams, of Cannon-street, St. George-in-the-East, for improvements in the construction of water-closets.

176. Jean Baptiste Moinier, of La Villette, Paris, for a new chemical process for the production of sulphates of soda, potassa, and alumina, of nitrates of soda and potassa, of soap, and of hydrochloric, sulphuric, stearic, morgaric, and elaidic acids.

177. Jean Louis Schlossmacher, of Paris, for an improved support of lamps.

178. John Ridgway, of Cauldon-place, Staffordshire, for certain improvements in the method of generating and applying heat to kilns, ovens, and furnaces, for manufacturing purposes.

179. William Irlam Ellis, of Salford, for certain improvements in turntables to be employed on or in connection with railways.

180. William Massey, of Bootle-cum-Linacre, near Liverpool, for improvements in artificial teeth and gums.

181. John Bapty, of Leeds, for certain improvements in machinery for preparing to be spun, wool and other fibrous substances when mixed with wool.
182. Samuel Cunliffe Lister, of Manningham, for improvements in combing wool, cotton, and other fibrous materials.
183. John Bird, of Oak Farm, Kingswinford, for improvements in kilns for burning bricks and other articles.

The above bear date January 24th.

184. Joseph Auguste Mingaud, of St. Pons, France, for certain improvements in producing ornamental surfaces on velvet or other hairy cloths or fabrics.
185. Edward Batten Walmsley, of Middle Mall, Hammersmith, for improvements in utensils, implements, and apparatus for the purposes of lighting, heating, and cooking.
186. William Edward Newton, of the Office for Patents, Chancery-lane, for an improvement in violins and other similar stringed musical instruments,—being a communication.
188. William Henry Thornthwaite, of Newgate-street, for an improvement in the manufacture of sulphuric acid.
189. Richard Archibald Brooman, of Fleet-street, for a new and improved fluid for illuminating purposes,—a communication.
190. Archibald Lockhart Reid, of Glasgow, for improvements in printing textile fabrics and other surfaces.
191. James Anderson, of Auchnagie, Perthshire, for improvements in obtaining motive power.

The above bear date January 25th.

192. Thomas Wicksteed, of Leicester, for improvements in the manufacture of sewage manure.
193. Thomas Wicksteed, of Leicester, for improvements in the manufacture of sewage manure.
194. Thomas Wicksteed, of Leicester, for improvements in the manufacture of sewage manure and in apparatus for that purpose.
195. Francis Mollett Blyth, of Norwich, for improvements in the mode of heating water for steam-boilers.
196. Charles Reeves, jun., of Birmingham, and William Wells, of Sutton Coldfield, near Birmingham, for an improvement or improvements in casting metals.
197. Sydney Smith, of Hyson Green Works, near Nottingham, for improvements in valves or apparatus for regulating the passage and supply of fluids.
198. Samuel Slack Stellard, of Welford, Leicester, for improvements in the manufacture of knit fabrics.
199. George Firmin, of Bath, for improvements in anchors.

The above bear date January 26th.

200. François Ferdinand Rohart, of Sotteville lès Rouen, France, for improvements in the preparation of a certain substance for clarifying liquids.
201. Patrick Moir Crane, of Canonbury Villas, New North-road, for an improvement in the manufacture of iron.
202. Alphonse Cajetan de Simencourt, of Paris, for improvements in composing and distributing type.
203. William Church and Samuel Aspinwall Goddard, both of Birmingham, for an improvement or improvements in ordnance.
204. Henry Tendall, of Hoxton, and William St. Clair Trotter, of the City of London, for improvements in machinery and apparatus for crushing, washing, and amalgamating auriferous quartz and other ores.
205. Thomas Thurlby, of Guildford-street East, Spa-fields, for improvements in the means of effecting instant communication between distant points of railway trains.
206. William Palmer, of Brighton, for improvements in the manufacture of materials for and in constructing houses and other buildings.
207. William Partington, of Bolton-le-Moors, for an improved construction of safety-valve for steam-engines.
208. Joseph Atkinson, of Richmond-grove, for improvements in thrashing machinery.

The above bear date January 27th.

209. Jules Joseph Louis Fournier, of Montpellier, for an improved mode of obtaining alcohol.
210. John Grist, of the New North-road, Islington, for an improved brake for railway and other carriages.
211. Mead Terry Raymond, of Clement's-lane, for improvements in apparatus for retarding and stopping trains of carriages on railways.
212. Josiah Latimer Clark, of Chester Villas, Canonbury Park, for improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.
213. Wellington Williams, of Cheapside, for a method of, and apparatus for, heating the heaters of box irons, and other like purposes.
214. David Chadwick, of Salford, and George Hanson, of Manchester, for improvements in meters for measuring water or other liquids, and vapours or gas.
215. Donald Bethune, of Toronto, Canada, for improvements in the construction of vessels propelled by steam or other motive power.
216. William Garnett Taylor, of Norfolk-terrace, Westbourne-grove, for improvements in certain parts of machines employed for preparing and spinning cotton, wool, hair, silk, flax, and other fibrous substances or materials.

217. William Woolford, of Bowling New Dye Works, Bradford, for improvements in pressing and watering moreens and other fabrics.
218. William Redgrave and Thomas Redgrave, both of Bow-street, for new railway signal lights, to be called "Redgrave's patent railway signal light.

The above bear date January 28th.

219. Peter Armand Le Comte de Fontainemoreau, of South-street, for improved means of preventing accidents on railways,—being a communication.
220. Peter Armand Le Comte de Fontainemoreau, of South-street, for certain arrangements for preventing accidents on railways,—being a communication.
221. Henry Jeremiah Iliffes and Nehemiah Brough, of Birmingham, for improvements in the manufacture of buttons and in attaching them to articles of wearing apparel.
222. William Phillips, of Birmingham, for improvements in the manufacture of coffins.
223. William Hodgson, of Wakefield, for improvements in machinery for the manufacture of looped fabrics.
224. Benjamin O'Neale Stratford, Earl of Aldborough, of Stratford Lodge, Wicklow, Ireland, for improvements in aerial navigation.
225. Joseph Rock Cooper, of Birmingham, for improvements in preparing or constructing and dressing rolls for rolling gun-barrels, tubes, and bars.
226. Richard Garrett, of Leiston Works, near Saxmundham, for improvements in thrashing-machines.
227. John Kershaw, of Dublin, for improvements in steam-engines.
228. John Henry Johnson, of Lincoln's-inn-fields, for improvements in the manufacture or production of gas, and in the application of the materials employed therein,—being a communication.
229. Robert Chapman, of Eaton, Norwich, for an apparatus for regulating the feed to mill-stones.

The above bear date January 30th.

230. Thomas Cox, of Wolverhampton, for an improvement or improvements in buttons, and in attaching the same to articles of dress.
231. Arnold Morel Fatio and François Verdeil, both of Paris, for improvements in preserving animal and vegetable substances.
232. Edward William Kemble Turner, of Praed-street, Paddington, for treating gold and other ores.
233. Thomas Hollingsworth, of Nottingham, for improvements in forming or applying tags to laces.
234. Luther Young, of Bow-lane, Cheapside, and Edwin Marten, of Louisa-street, Stepney, for improvements in apparatus for regulating the pressure and supply of gas.

235. Caroline Erckmann, of La Villette, near Paris, for the manufacture of telegraphic wires.
236. Isaac Hazlehurst, of Ulverstone, for improvements in the manufacture of iron by blast, and in the construction of furnaces and machinery for the same.
237. Richard Oliver, Robert Barlow, and James Blundell, of Manchester, for certain improvements in machinery or apparatus for embossing and cutting out patterns or devices, for the ornamentation of textile fabrics or other materials or surfaces.
238. Louis Christian Koeffler, of Rochdale, for certain improvements in machinery or apparatus for preparing, dressing, and finishing yarns or threads.
239. Louis Christian Koeffler, of Rochdale, for certain improvements in the method or process of scouring, washing, and oiling wool and other textile materials, for the purpose of spinning, and in the machinery or apparatus connected therewith.
240. William Wright and George Brown, of Newcastle-upon-Tyne, for improvements in cupolas; which improvements are also applicable to smelting and other furnaces.
241. Pierre Joseph Meeus, of Paris, for improvements in producing metallic surfaces.
242. William Malam, of Blackfriars-road, for improvements in apparatus for the manufacture and holding of gas.
243. Richard Archibald Brooman, of Fleet-street, for improvements in the manufacture of steel,—being a communication.
244. Philibert Beudot, of Boulevart St. Martin, Paris, for improvements in gas burners.
245. James Jackson, of Broad-street, Golden-square, and George Morris Hantler, of Sloane-street, for improvements in baths.

The above bear date January 31st.

246. Claude Bernard Adrien Chenot, of Paris, for improvements in accumulating, conducting, and treating gases of combustion and also in generating and applying the same to metallurgic and other purposes.
247. Henry Wickens, of Tokenhouse-yard, for improvements in the mode of intercommunication in railway trains.
248. Augustin Mortera, of Paris, for improvements in apparatus for stopping locomotive engines, waggons, or other vehicles, on railways.
249. John Buchanan, of Leamington Priors, for improvements in propellers, and in applying them.
250. John Burgum, of Birmingham, for a new or improved self-acting damper, for the furnaces of steam boilers.
251. William Guest, of Sneinton, Nottinghamshire, for improvements in machinery for making whips; parts of which improvements are also applicable to the manufacture of braids and wire nets.

253. Albert Robinson, of Whitehall-place, for improvements in preparing compositions for coating iron and other ships' bottoms and other surfaces.
254. Charles François Le Page, of Paris, for certain improvements in apparatus for lighting.
255. John Jobson, of Litchurch Works, near Derby, and Robert Jobson, of Holly Hall Works, near Dudley, for improvements in the manufacture of moulds for casting metals.
256. Alfred Daniel, of Moorfields, Wolverhampton, for improvements in locks, and handles for the same.
257. James Hargreaves and James Fletcher, both of Facit, near Rochdale, for certain improvements in machinery for preparing to be spun cotton and other fibrous materials.
258. John Dewar Morrison, of Sunderland, for improvements in winches.
259. Joseph Beattie, of Lawn-place, Lambeth, for improvements in furnaces, and in the treatment of steam.

The above bear date February 1st.

260. Thomas Atkins, of Oxford, for improvements in transmitting power and communicating motion to implements for agricultural and other purposes.
261. Adolphe Mohler, of Obernay, France, for certain improvements in apparatus for lubricating machinery.
263. Charles Emile Paris, of Paris, for certain improvements in covering with metals certain metallic surfaces.
264. James Stevens, of Darlington Works, Southwark-bridge-road, for improvements in apparatus for giving railway signals.
265. John Hamilton Glassford, of Glasgow, for improvements in lithographic and zincographic printing.
266. Frederic Henry Sykes, of Cork-street, Piccadilly, for an improved apparatus for supplying or feeding boilers with water, applicable to raising and forcing liquids for other purposes.

The above bear date February 2nd.

268. Auguste Edouard Loradoux Bellford, of Castle-street, for a new system of apparatus to be called "atmospheric post," for transmitting letters and messages, and applicable to railways, and as a speaking trumpet,—being a communication.
270. Robert Brockman Newhouse, of Uckfield, for improved apparatus for conducting off the gases of combustion from open fire-places.
272. Alfred Lannes, Marquis of Montebello, of Mareuil-sur-Ay, France, for an improved propeller, applicable to the navigation of ships and other vessels.
274. Edward Howard and David Porter Davis, of Massachusetts, for improvements in machinery for sewing cloth or other material,—being a communication.

The above bear date February 3rd.

List of Patents

Granted for SCOTLAND, from the 22nd January, to the 22nd February, 1854.

To James Mc Henry, of Liverpool, merchant, for improvements in machinery for manufacturing bricks and tiles.—Sealed 6th February.

Frederick George Underhay, of Well-street, Gray's-inn-road, London, for improvements in apparatus for regulating the supply of water to water-closets and other vessels, and to taps or cocks for drawing off liquids.—Sealed 6th February.

William Boggett, of St. Martin's-lane, London, and George Brooks Pettit, of Lisle-street, London, gas engineer, for improvements in obtaining and applying heat and light,—Sealed 7th February.

Enoch Steel and William Britter, manufacturers, Surrey, for improvements in the manufacture of tobacco-pipes.—Sealed 8th February.

Auguste Edouard Loradoux Bellford, of 16, Castle-street, Holborn, London, for improvements in the construction of springs for railway and other carriages.—Sealed 13th February.

William Herbert Gossage, of Howden, in the county of Northumberland, chemist, for improvements in the concentration of sulphuric acid and certain other fluids; also in the use of a certain product or certain products sometimes obtained in manufacturing sulphuric acid and sulphates.—Sealed 15th Feb.

New Patents.

Sealed under Patent Law Amendment Act, 1853.

1739. John Hall.
1741. S. Barlow and J. Pendlebury.
1744. Alexander Clark.
1766. P. A. Le Comte de Fontainemoreau.
1768. Edward Herring.
1771. Thomas Forster.
1777. William E. Newton.
1778. William Wild.
1779. William T. Henley.
1794. Samuel C. Lister.
1802. William Perks, jun.
1804. William H. Clarke.
1805. Antoine J. Quinche.
1811. Joseph C. Daniell.
1820. William Hickson.
1821. Charles H. Snell.
1822. George Armitage.
1823. Charles Butler Clough.
1826. B. L. F. X. Fléchelle.
1828. Joseph Lallemand.
1831. W. Smith and T. Phillips.
1835. James L. Norton.
1841. Richard B. Martin.
1843. Robert Morrison.
1846. R. Christy and J. Knowles.
1850. Thomas Young Hall.
1860. J. P. A. Galibert.
1862. Thomas Mac Sweny.
1865. David Mushet.
1867. J. B. Finnemore and E. D. Chattaway.
1868. Thomas Dewsnup.
1869. Thomas Kelley Hall.

1878. Samuel Adams.
1879. Louis Van Caneghem.
1880. James Strong.
1881. T. Turner and J. F. Swinburn
1883. Read Holliday.
1887. R. A. Brooman.
1888. William Littell Tizard.
1889. Thomas Allan.
1891. Wm. Aldred, Rd. Fenton, and Wm. Crone.
1894. Robert S. Bartleet.
1895. Frederick Lipscombe.
1898. G. Peel and R. Brownhill.
1900. John Gwynne.
1902. J. Gwynne & J. E. A. Gwynne.
1906. Hesketh Hughes.
1916. John Atherton and J. Abbott.
1917. Peter Foxcroft.
1918. George Richardson.
1923. F. A. V. Delarbre.
1924. T. C. Ogden and W. Gibson.
1926. Thomas Grimsley.
1930. David Chalmers
1931. David Harkes.
1932. Alexis Pigé.
1937. William Cornelius.
1938. A. M. M. de Bergevin.
1940. F. W. A. De Fabeck.
1946. J. B. Polaillon & F. Maillard.
1948. W. Vaughan & J. Scattergood.
1951. Samuel Lomas.
1953. Auguste E. L. Bellford.
1963. John Whiteley.
1977. William Austin.
1985. Richard Roberts.
1988. Charles William Lancaster.
1989. James Hill.
2029. J. Taylor, J. Griffiths, and T. Lees.
2032. A. Carosio.
2037. Thomas Walker.
2076. M. L. Parnell.
2167. H. C. Jennings.
2171. Charles Collins.
2202. James Grafton Jones.
2207. C. Maitland and W. Gorrie.
2224. Joseph F. Van Waesberghe.
2232. James Griffiths.
2257. J. Leadbetter and W. Wight.
2272. Alexander Turiff.
2290. Charles A. Holm.
2302. A. E. D. K. Archer.
2308. George L. Smartt.
2317. G. F. Wilson.
2328. John C. Sharp.
2423. John France.
2467. Weston Grimshaw.
2483. Thomas S. Blackwell.
2486. George E. Dering.
2513. John Gray.
2514. George Hamilton.
2567. William Foster.
2612. James Willis.
2615. John Platt.
2622. Stephen Barker.
2639. William Smith.
2643. Charles E. Blank.
2644. John Liddell.
2648. Joseph Fry.
2649. Peter A. Halkett.
2678. Amédée F. Remond.
2683. Patrick B. O'Neill.
2718. Francis Arding.
2723. J. Hill, sen., and J. Hill, jun.
2726 James Dilks.
2737. Samuel C. Lister.
2739. William Jones.
2740. Daniel L. Banks.
2742. Davidson Nichol.
2743. John Berry.
2744. William Calder.
2745. W. L. Brook and C. Brook, jun.
2757. Joseph Stenson.
2765. Joseph M. H. Perodeaud.
2805. George Williamson.
2807. John C. Wilson.
2808. George Collier.
2810. Samuel C. Lister.
2811. Henry Bessemer.
2812. Jonathan Saunders.
2815. Charles Buck.
2823. Matthew A. Muir.
2825. Thomas Storey.
2826. James Robertson.
2835. Robert C. Witty.
2838. John Hargrave.
2843. John Getty.
2848. Benjamin Solomons.
2851. Joseph Robinson.
2854. William E. Newton.
2860. Arthur James.
2863. C. Mackenzie & A. Turnbull.
2868. John Chisholm.
2875. Henry Bessemer.
2886. Thomas Holinsworth.
2896. F. A. Gatty and E. Kopp.
2906. Samuel Messenger.
2916. Alexander Cochran.
2962. James Burrows.

CELESTIAL PHENOMENA FOR MARCH, 1854.

D.	H.	M.	
1			Clock before the ☉ 12m. 37s.
—			☽ rises 8h. 7m. M.
—			☽ passes mer. 2h. 12m. A.
—			☽ sets 8h. 32m. A.
2	19	53	☿ in Perihelion
3	5	40	♅ in conj. with the ☽ diff. of dec. 1. 55. N.
	12	30	♀ greatest hel. lat. S.
4	16	1	♄ in conj. with the ☽ diff. of dec. 1. 9. S.
5			Clock before the ☉ 11m. 46s.
—			☽ rises 9h. 14m. M.
—			☽ passes mer. 5h. 12m. A.
—			☽ sets 0h. 14m. M.
6			Vesta in conj. with ♂ diff. of dec. 6. 13. N.
	7	10	☽ in □ or first quarter
	13	10	☿ greatest elong. 18. 10. E.
7	8	0	☽ in Apogee
8			Occul. 37 Geminorum, im. 9h. 23m. em. 10h. 36m.
9			Occul. *k* Geminorum, im. 8h. 43m. em. 10h. 4m.
—			Juno in the ascending node
10			Clock before the ☉ 10m. 32s.
—			☽ rises 0h. 49m. A.
—			☽ passes mer. 9h. 20m. A.
—			☽ sets 5. 6. M.
11	19	58	Juno in oppo. the ☉, intens. of light 0·742.
12	14	10	♂ in conj. with the ☽ diff. of dec. 1. 6. S.
13			Mercury, R. A., 0h. 24m. dec. 6. 3. N.
—			Venus, R. A., 22h. 8m. dec. 3. 9. S.
—			Mars, R. A., 10h. 23m. dec. 14. 18. N.
—			Vesta, R. A., 10h. 27m. dec. 20. 29. N.
—			Juno, R. A., 11h. 27m. dec. 3. 45. N.
—			Pallas, R. A., 19h. 16m. dec. 8. 59. N.
—			Ceres, R. A., 20h. 10m. dec. 23. 44. S.
13			Jupiter, R. A., 19h. 34m. dec. 21. 45. S.
—			Saturn, R. A., 3h. 39m. dec. 17. 40. N.
—			Uranus, R. A., 2h. 30m. dec. 14. 25. N.
—			Mercury passes mer. 1h. 1m.
—			Venus passes mer. 22h. 40m.
—			Mars passes mer. 10h. 58m.
—			Jupiter passes mer. 20h. 8m.
—			Saturn passes mer. 4h. 16m.
—			Uranus passes mer. 3h. 6m.
	3	58	☿ greatest hel. lat. N.
	9	45	☿ stationary
14	5	53	Ecliptic oppo. or ○ full moon
15			Clock before the ☉ 9m. 9s.
—			☽ rises 7h. 3m. A.
—			☽ passes mer. 0h. 29m. M.
—			☽ sets 6h. 57m. M.
—			Occul. 48 Virginus, im. 17h. 54m. em. 18h. 53m.
18	23	12	♀ stationary
20			Clock before the ☉ 7m. 40s.
—			☽ rises 0h. 33m. M.
—			☽ passes mer. 4h. 39m. M.
—			☽ sets 8h. 37m. M.
	10	20	☉ enters Aries,—Spring comms.
21	6		☽ in □ or last quarter
	16		☽ in Perigee
22	19	20	♃ in conj. with the ☽ diff. of dec. 3. 50. N.
23	9	52	☿ in sup. conj. with the ☉
25			Clock before the ☉ 6m. 9s.
—			☽ rises 5h. 15m. M.
—			☽ passes mer. 9h. 36m. M.
—			☽ sets 2h. 0m. A.
	7	31	♀ in conj. with the ☽ diff. of dec. 11. 18. N.
27	8	52	☿ in conj. with the ☽ diff. of dec. 7. 41. N.
28	4	52	Ecliptic conj. or ● new moon.
30			Clock before the ☉ 4m. 36s.
—			☽ rises 6h. 41m. M.
—			☽ passes mer. 1h. 33m. A.
—			☽ sets 8h. 40m. A.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CCLXVIII.

RECENT PATENTS.

To LEMUEL WELLMAN WRIGHT, *of Chalford, in the county of Gloucester, engineer, for improvements in machinery or apparatuses for reducing and pulverizing gold and other metalliferous quartz and earths, and in separating metal therefrom.*—[Sealed 2nd July, 1853.]

THIS invention has relation to the use of three different kinds of apparatus for the reducing and pulverizing of gold and other metalliferous quartz, and for the separation of the metal therefrom;—the first for reducing the heavy quartz or dense and hard earths; the second for pulverizing the same; and the third (which comprises mixing and washing arrangements) for separating the gold or other metal from the pulverized quartz or earths containing the same.

The first apparatus consists of a central iron cylinder or roller mounted upon a shaft revolving in bearings in the framework of the machine. Outside this cylinder, and mounted upon a separate axle, are two rings, in which are bearings for the reception of the axle of five or more smaller iron rollers, caused to revolve by frictional contact with the central cylinder. These smaller rollers do not extend entirely round the circumference of the cylinder, but only to about one-half thereof. The inner cylinder is caused to revolve; the quartz or earth is directed into the apparatus between the upper roller and cylinder; and by the revolution of this cylinder it is carried successively between it and the remaining rollers, and finally leaves the apparatus,—being caused to pass between and issue from the two last rollers in the series.

The second machine or apparatus, into which the partially reduced quartz or earth may be transferred to be pulverized, consists of a pair of heavy rollers, free to revolve upon the shaft, mounted in bearings in the frame. Under these rollers is a rotary disc or platform, on which the material to be pulverized is placed; it is provided with scrapers or gatherers, and is caused to revolve: the gatherers continually present the stuff under the heavy rollers, which are caused to revolve upon their axle by contact with the rotary disc. It is generally found advisable to add to the stuff sufficient moisture to bring it into the state of paste.

The third, or washing machine, consists of a wheel with dashers, caused to revolve in a trough or vessel in which metalliferous quartz, in a pulverized state, is placed; in order to break it up, and mix it well with water fed into the trough. The water and metalliferous stuff then flow through a channel into a deep vessel, inside which is an agitator, consisting of a cross head with two or more arms depending therefrom suspended from a shaft passing through the top of the vessel, and to which rotary motion is communicated. The centrifugal action produced by the rotation of the agitator will cause the lighter materials to be thrown to the outer circumference of the revolving column; while the heavier materials, which flow nearer the centre, will gradually fall in the direction of the axis of the revolving column, and will be finally deposited on the bottom of the vessel.

In Plate VII., fig. 1, represents a side elevation of a machine for crushing or breaking down quartz rock or earths, compounds, or metalliferous ores containing gold or other metal, previous to being reduced to a state of powder by other arrangements of machinery, as hereinafter explained. A, A, is a central cylinder of iron firmly fixed upon the shaft B. This cylinder forms the prime moving power, being driven by means of a steam-engine or by water. C, C, are a number of smaller cylinders arranged round a portion of the cylinder A, and driven by frictional contact therewith. D, D, are cheeks or framework for supporting and combining the several parts of the machine, being connected and held together by transverse iron tie-rods *a*, *a*. The spindles of the cylinders C, C, are supported and turn in blocks E, E, capable of being adjusted by screws F, F, in order to regulate the distance or space between the main cylinder A, and the smaller cylinders C, C, as circumstances may require. Or the cylinders C, C, may be adjusted and held up against the main cylinder A, by means of weighted levers, or any other convenient contriv-

ance. The adjusting blocks E, E, rest on and are supported by iron bearers G, G, which are connected to or form part of the framework D, D. H, is a fly-wheel on the main shaft B, for regulating the motion of the machine. I, is a hopper from which the machine is fed or supplied with the ore or other substance to be crushed. The action of the machine will be readily understood from the foregoing description of its construction.

Fig. 2, represents a side elevation, partly in section, of a machine for reducing the ore or other substance to an impalpable powder, after having been subjected to the action of the crushing machine just described. A, is a circular disc of cast-iron (shewn in section) flanged at the edge, and firmly fixed to the upright shaft B, which is also of cast-iron. The lower end of this shaft turns in a cast-iron step C, fixed to the base of the framing, and the upper end works in bearings D, in the upper part of the framing. E, E, are two cast iron cylinders or rollers running on edge, and resting on the disc A, and revolving by contact with it. F, F, is bevilled gearing, by which motion is communicated from any suitable prime mover to the shaft B, and disc A, and from this latter to the cylinders or rollers E, E, as before mentioned. G, G, is the shaft or axle on which the rollers E, E, revolve; and H, H, are the bearings for the shaft G, G, fixed to the framing of the machine. The rollers E, E, instead of being formed with flat surfaces working against the disc A, may be constructed with convex surfaces working into a corresponding concavity in the disc, as shewn at *a, a*. The ore or substance to be reduced in this machine, having been previously crushed in the machine shewn in fig. 1, is introduced into the machine, with a sufficient quantity of water to cause it to be worked by the action of the rollers E, E, into a stiff pasty mass; in which state it is removed for subsequent treatment. The machine should be furnished with gatherers or scrapers, so as to cause the material to be kept constantly under the rollers E E, as the disc A, revolves.

Fig. 3, is a side elevation of a machine for mixing the pulverized ore as it comes from the machine, fig. 2. A, is a three-sided box or trough, open at top, in which is fitted a float-wheel B, by which the pulverized ore is agitated and mixed previous to its passing into the washing machine. In working with this machine, the wheel B, is put in motion in the direction of the arrow, by any convenient means, and water is admitted into the box A, by a pipe and cock, in sufficient quantity to bring the mixture to a regular and suitable consistency for subsequent operations, as it passes from the box A, by the spout C.

The quantity of water required will depend upon that of the pulverized ore placed in the box A.

Fig. 4, is a vertical section of a washing machine for operating on the mixture of ore and water coming from the mixing machine just before described. A, is a cylindrical vessel or casing composed of wood or metal, and having a spherical bottom. B, is an agitator or stirrer, composed of a cross-head with two or more vertical arms: it works inside the cylinder A, and reaches nearly to the bottom of it. C, C, are bevil-wheels, by which the agitator B, is set in motion; and means should be provided for enabling the velocity of the motion to be increased or diminished as may be required. In working with this machine, the cylinder A, is filled with water nearly to the level of the trough leading from the mixing machine; and the agitator B, is then set in rapid motion by means of the gearing C, C; when the water will take a circular course, somewhat as shewn by the dotted lines *a, a.* The mixture of ore and water from the mixing machine is then admitted to the cylinder, and the semi-fluid mass will then also take the same circular course as the water; the lighter particles being thrown by centrifugal force from the centre towards the sides of the cylinder; while the heavier particles will arrange themselves, according to their specific gravity, nearer to the centre. The heaviest particles of gold and other metals will be found at the centre of the cylinder, where they will fall by gravitation, and form a conical heap at the bottom, as shew at a^1, a^1; and the lighter particles will flow out through the pipe D, the cock of which is left open during the operation. When the washing is completed, the gold and metal collected at the centre of the cylinder can be withdrawn through the pipe E, by opening the cock attached to it.

The patentee claims, First,—the machinery or apparatus for crushing gold quartz and metalliferous ores, represented in fig. 1, and hereinbefore described, in so far as regards the employment therein of the main or central cylinder combined with several small cylinders partly surrounding the same, and revolving by contact with the main cylinder and the materials under process of crushing. Secondly,—the machinery or apparatus for reducing or pulverizing gold quartz and metalliferous ores, represented in fig. 2, and hereinbefore described, in so far as regards the employment therein of the horizontal rollers or cylinders working against a revolving table or disc, and caused to revolve by contact therewith; and the employment of scrapers or gatherers for keeping the material to be reduced under the action of the horizontal rollers. Thirdly,—

the mixing machine represented in fig. 3, and the washing machine represented in fig. 4, and hereinbefore described: each in the peculiar combination of parts of which the same consists.

To AUGUSTE EDOUARD LORADOUX BELLFORD, *of Castle-street, Holborn, for certain improvements in machinery for grinding and reducing gold quartz to an impalpable powder, and amalgamating the said ground quartz with quicksilver; the same being applicable also to the pulverizing and washing of ores,—being a communication.*—[Sealed 29th December, 1852.]

IN Plate VII., fig. 1, is a perspective view of the apparatus.* The machinery here represented exhibits a set of stampers, placed on an elevation above the pulverizing and amalgamating basins. The stampers are of the usual form, and are operated in the common manner, as here exhibited. A strong frame is erected. *a*, is a cross sill or bearing brace, one on each side, having journal boxes for the lifter-shaft *h*, which receives motion from the main shaft *d*, which is driven by animal, water, or steam-power; giving motion to the crank through the connecting rod *c*. The cog-wheel *f*, gears into the one, *g*, on shaft *h*, and rotates the lifter-shaft. On this are a series of horns or lifters *i*, for lifting the stampers. There are slots in the vertical shafts or arms of the stampers, into which the lifters take as they revolve, and lift the stampers to a height corresponding with the length of the lifter (15 inches); the stamper then drops down (45 times in a minute) on the quartz in the trough, with a blow like that of a hammer weighing 600 lbs. *m*, is the cast metal bottom of the quartz trough. *n*, is a wire screen, through which the pounded quartz, reduced to about the size of small shots, passes from the stamper trough to the receptacle *o*, into the several spouts *p*, *p*, and thence into the pulverizing and amalgamating basins. On the other side of the stampers is an inclined iron plate to guide the ore under the stampers. The upright shafts or arms of the stampers are guided through openings in the guide-boards *b*, *b*, to drop perpendicularly on the quartz. *l*, *l*, are the hammers of the stampers, made of the best chilled iron. These hammers are so formed as to do double duty,—the top weights *k*, *k*, being

* A sheet of detailed drawings accompanies this specification; but as no reference is made thereto, and the description refers solely to a perspective view which accompanied the provisional specification, we have adopted that figure in place of the detailed drawings, and are thereby enabled to render the description comprehensible.—ED.

hammers also, and capable of supplying the places of *l, l.* The pulverizing and amalgamating basins are set in an inclined position. Four of these basins *q, q,* are shewn, set in one frame, receiving the pounded quartz: it is pounded with a small stream of water flowing in from the spouts *p, p.* Each basin is a large circular iron vessel like a potash kettle, and set at an angle of about 45°. The basins are made to revolve, and this gives each ball a rotary motion on its own axis contrary to the motion of the basin. There is one ball *r,* for each basin. Each ball keeps rolling in the lower inclined part *z,* of its basin, into which the pounded quartz is gathered, and there exposed to the rolling pulverizing weight and motion of the ball which rolls on the quartz; while the basin, as it rotates on its axis, is continually presenting a new surface of quartz. The quicksilver is placed in the lower part of the basin; and the weight of the ball and its motion keeps it in continual contact below the surface with the pulverized quartz. This prevents any of the oxide of iron, which may be in the quartz, from forming a coating to prevent the contact of quicksilver with the gold. The oxide is rubbed off, and passes out with the surface water: it is therefore superior to a mere surface amalgamator. Each ball weighs about 3000 lbs: it can be cast solid, or, for convenience, cast hollow, and then filled with black sand at the mines. The ball motion is the best to reduce the quartz to an impalpable powder; in which state it must be for proper washing, or for amalgamation with the mercury. The lighter matters pass off at the lower lip of each inclined basin, through a spout. The basins are therefore pulverizing, washing, and amalgamating machines. These basins are each made with conical funnels reaching down to the lower bearing of each. The funnels are not shewn; but it will explain their form to say they are shaped in elevation like the common kind, which gives them a firm bearing below to support each basin. These funnels are made hollow so as to admit of being made into furnaces for heating the basins, to promote the quick amalgamation of the metals, which is said to be done by a certain degree of heat. It is also proposed to let the exhaust steam (when an engine is employed for driving) into the water of the stampers, so as to heat it also. The same water that is employed for stamping the quartz passes into the basins, for the purpose of economizing the water in places where it is scarce. The waste water and impurities pass from the basins by the conduit *t.* Motion is given to the basins—they have a vertical axis—by means of cog teeth *y, y,* cast on the outside at the bottom of each. A

cog pinion *x*, *x*, on a cross shaft, takes into the teeth on its basin, and gives it a rotating motion on its axis. The shaft of these pinions *x*, has a central pinion *w*, that receives motion from the large middle wheel *v*, on a central shaft, and which thus moves all the basins. Any number of basins may thus be set in rows, and thus moved by a band *u*, from the pulley *e*, of the main shaft *d*,—driving a pulley on the central shaft of the large cog-wheel *v*. The arrangement, motions, and operations of the several parts are now explained.

The patentee claims the employment, for the purpose of reducing gold quartz to an impalpable powder, and amalgamating the same with quicksilver, and also pulverizing and washing ores, of any number of basins *q*, *q*, and balls *r*, *r*, constructed, arranged, and operating substantially as described; to wit, the basins being concave, and placed in an inclined position, and having rotary motion; and the balls being placed loosely, one in each basin, receiving rotary motion in the opposite direction to the basins containing them, by means of the contact of their surfaces.

To Auguste Edouard Loradoux Bellford, *of Castle-street, Holborn, for improvements in machinery for pulverizing and washing quartz or ore, and for amalgamating the gold contained therein,—being a communication.*—[Sealed 17th June, 1853.]

The nature of the first part of this invention consists in the employment, for the purpose of pulverizing quartz or ore, of a spherical ball placed within a circular basin, whose axle moves in such a way as to describe a cone around an imaginary fixed axis, but does not cause the basin to rotate. The basin is so formed that the ball nearly fits to its sides. The imaginary axis, round which the axle of the basin revolves, is intended to be vertical, and, consequently, the bottom of the basin must always be in a similarly inclined position, though the position of the basin is constantly changing in such a way as to make all the points in any circle described from its axis successively the lowest points in the said circle,—every point moving, as it were, in a circular inclined plane. The ball will always descend by its gravity to the lowest place in the interior of the basin; but, as every point in the circle of the basin in which the ball remains, commences ascending as it passes the ball, it has a tendency to carry up the ball with it. This tendency is overcome by the gravity of the ball; whereby it is caused to rotate on its axis in the same manner as a ball

descending an inclined plane, and always to keep at the lowest part of the basin; where, by its rolling motion, it is made to grind and pulverize the material placed in the basin. The peculiar movement of the basin admits of the quartz or ore being kept all towards the working point of the ball; and keeps the entire mass of its contents constantly and thoroughly agitated; so that all the particles are subjected alike to the action of the ball.

Secondly, this invention consists in the combination with a ball and basin (having the movements above described) of an outer basin placed below, with a space between it and the washing-basin, moving with the crushing-basin, and having communication with it through an opening or openings in the centre, which is or are protected by a screen or screens. This outer basin contains mercury for amalgamating the gold or metal. A constant stream of water is admitted into the crushing-basin; and this, combined with the action of the ball, washes and throws all the crushed portions of the matter over the screen, through which the finer portions descend to the outer pan, where the gold or metal amalgamates with the mercury; and from which the quartz or other foreign matter is washed by the stream of water.

Thirdly, this invention relates to a device for counteracting the too great centrifugal tendency which may be imparted to the crushing-ball by the revolution which it is caused to make around the axle of the basin and the imaginary axis round which the axle moves. The axle of the basin receives its motion through a crank, connected to one end thereof; and the increasing centrifugal force of the ball is made to shorten the effective length of this crank, and thus reduce the motion of the basin, and the inclination of the plane which is presented to the ball.

Fig. 2, in Plate VII., represents the improved machine, for pulverizing quartz, in vertical section. A, is the frame of the machine, and B, the driving-shaft, which occupies a vertical position and receives motion through a belt-pulley C, from any prime mover. The upper end of the shaft is forked to receive a block D, of metal, which is connected to it by a pivot *f*. E, is the lower or amalgamating basin, which is intended to be of cast-iron of circular form, and has a hub *a*, projecting some distance from the inside of the bottom to receive the shaft F, on which it is firmly secured. G, is the inner or crushing-basin, which is so formed as to make a trough or channel M, all round its bottom to receive the ball. The raised circular part H, of the basin within the trough,

rests upon a number of bearing-pieces *b*, *b*, which stand up from the bottom of the basin E; and it has a hub *c*, which fits to the shaft and rests on the hub *a*. The two basins are secured to each other, and to the shaft, by any suitable means. The raised circular part H, of the basin G, is open,—the hub being merely united to the trough by radial arms; and the opening is covered by a screen L.

The upper end of the shaft F, is suspended at a fixed point: the suspension may be made with any joint which will admit of its turning freely in any direction; such as a hook *d*, and eye *e*. The lower end of the shaft is connected by a crank to the shaft B. This crank, instead of being a bar or block, rigidly connected to the two shafts, consists of a rod I, which is fitted to work freely in a hole made in the block D, at right angles to the pivot *f*. At one end is pivoted a metal box J, which is bored to receive a journal *i*, on the lower end of the shaft F. A spring *g*, is applied between the block D, and a shoulder near that end of the rod I, to which the shaft F, is connected; and another spring *h*, is applied between the said block and a shoulder at the opposite end of the rod: both these springs exert their force by pushing from the block.

The ball K, may be of solid cast-iron, or, for convenience of transportation, may consist of a hollow cast-iron shell, which may be filled with the heaviest available materials.

The operation of the machine is as follows:—The quartz, ore, or auriferous mineral, after being broken into small pieces, is fed in a suitable quantity to the basin G, and is there subjected to the action of the ball K, which fits to the trough or channel M, in such a way as to leave room for some of the matter under and at the sides of the ball, where it is submitted to a crushing and grinding operation. The stream of water which is let into the trough G, washes up all the finely-pulverized particles, and carries them through the screen L, where there is a constant overflow to the basin E, containing the mercury. In the latter basin a constant agitation is kept up by the peculiar motion imparted to it, and by it every particle of the gold or metal is brought into contact with the mercury, and amalgamated with it; while the quartz or other foreign mineral matter is washed away by the constant overflow at the lowest part of the edge of the basin E. The amalgam is withdrawn from the basin through a suitable valve or trap *l*, in any part of the bottom. The ball K, owing to the constant change in the position of the lowest portion of the basin, moves in a horizontal plane, in a circle described from the imaginary central axis round which the axle of the

basin moves, and thus acquires centrifugal force, which tends to throw the lowest side of the basins from the centre. This centrifugal force is, in a certain degree, but not perfectly, counteracted by the gravity of the ball, which tends to lengthen the crank, while the centrifugal force tends to shorten it. The shortening of the crank reduces the extent of the motion of the basin, and lessens the inclination of the plane down which it may be said to be descending, and thus arrests the centrifugal tendency. The springs *g*, and *h*, admit of the lengthening and shortening of the crank, and hold it at a desirable length, when not otherwise unduly influenced, and also serve to prevent shocks to the machine in stopping and starting.

The patentee remarks, that the lower end of the shaft F, may be attached at a fixed point, and the upper end may be attached to a crank, and this will give a motion to the basins, similar to the arrangement shewn.

He claims, Firstly,—the employment, for the purpose of pulverizing quartz, or ore, or any mineral matter containing gold or other metal, of a spherical ball K, within a circular basin G, whose axis moves so as to describe the periphery of a cone, but which does not revolve,—the said motion being produced by any mechanical means equivalent to those described. Secondly,—the combination, substantially as shewn, with a crushing or pulverizing-basin G, (moving as described) of an amalgamating-basin E,—the said amalgamating-basin being placed below the said crushing-basin; having the same axis and moving with it, and having communication with the said crushing-basin through a screened opening in the centre of the same. And, Thirdly,—connecting the shaft F, which forms the axis of the basins, to the driving-shaft, by means of a crank I, whose length is capable of being varied by the increasing or decreasing centrifugal force acquired by the ball, but which is regulated, when the crank is not otherwise unduly influenced, by springs *g*, *h*, on either side of one of its connections, substantially as described.

To JOHN GRAY, *of Rotherhithe, engineer, for an improved apparatus for consuming smoke.*—[Sealed 1st August, 1853.]

THIS invention consists in constructing the bridges or back parts of furnaces with two passages or sets of passages communicating with each other, and with a common chamber or

passages for the admission of air, and arranged as hereinafter described.

In Plate VIII., fig. 1, is a longitudinal section of the improved furnace, as applied to the heating of a steam-boiler. *a*, is the boiler; *b*, the grate; *c*, the bridge; and *d*, the brick-work setting of the boiler.

The bridge *c*, is made of fire-brick or other suitable material, supported on a cast-iron plate *e*, beneath which is the vertical plate *f*, having an aperture with a valve or damper *g*. *h*, is a wall or mass of brickwork beyond the bridge *c*; and *i*, is a slit or series of openings between the brickwork *h*, and the bridge *c*. *k*, *k*, are other openings through the bridge into the furnace. The openings *i*, and *k*, communicate with the chamber *l*, into which air enters at the valve *g*.

The action of the apparatus is as follows:—A fire of coal is made on the grate *b*, and a portion of the products of combustion passes over the bridge, while another portion passes through the openings *k*, *k*, and meeting with a current of air entering at the valve *g*, the hot mixture so produced passes up through the slit or openings *i*, and meets the first portion of the products of combustion, which is passing over the bridge. The unconsumed gases are thus ignited, and the combustion is found to be more perfect than when cold air is simply admitted at the slit *i*, as in some of the smoke-consuming furnaces heretofore used. By opening the valve *g*, to its full extent, a portion of the air passes through the openings *k*, into the furnace, and the remainder through the slit or openings *i*; in which case it is found advantageous to heap up the fuel so as partially to cover the openings *k*, or even entirely to cover them. By this means a vivid combustion is produced at or close to the bridge, which acquires a high temperature; and the remaining unconsumed gases, in their passage over the bridge, come in contact with the air passing through the openings *i*, and become ignited. The patentee remarks that it is not absolutely necessary to employ the valve *g*, as the opening for the admission of the air may be permanently adjusted, in the first instance, to produce the required result.

Fig. 2, shews in longitudinal section, the apparatus constructed without the valve, and adapted to a furnace placed within a steam-boiler. *a*, is the outer shell of the boiler; *m*, the flue which contains the fire-bars *b*, bridge *c*, and wall *h*; *e*, is the plate which supports the bridge; and *f*, is the vertical plate beneath it. This plate does not reach to the bottom of the flue *m*, but is cut off, to leave a space *g*, for the entrance of the air. The other parts are similar to those similarly

marked in fig. 1. The ends of the grate-bars *b*, pass under the plate *e*, which arrangement is advantageous in cases wherein grate-bars having a reciprocating end motion are employed.

The patentee states that he has shewn his apparatus as adapted to steam-boilers; but it is obvious that it is also applicable to brewers' coppers, bakers' ovens, reverberatory furnaces, and many other descriptions of furnaces.

He also remarks that he does not claim, generally, the admitting of air at the bridge of a furnace; but what he claims is, the constructing the bridges or back parts of furnaces with two passages or sets of passages communicating with each other and with a common chamber or passage for the admission of air, and arranged in manner hereinbefore described.

To Alphonse Rene le Mire de Normandy, *of Judd-street, for improvements in regulating the pressure of steam.*—[Sealed 26th May, 1853.]

This invention consists in employing a valve apparatus between a steam-boiler and a vessel or vessels or chambers in which the steam is to be used at a lower pressure than that at which it is generated. The apparatus may be arranged in such manner that several processes, each requiring a different pressure of steam, may have the steam supplied from one and the same boiler. The valve in each apparatus is connected to a flexible surface of such dimensions, compared with the size of the valve (which closes the passage between the boiler and the apparatus where the steam is to be used), as will, by the lesser pressure of the steam thereon, close the valve, and prevent a further incoming of steam from the boiler, so long as the steam remains at the desired pressure; but so soon as the lesser pressure of steam on the larger area will not sustain the valve in its seat, a fresh influx of steam will be admitted, to make up for the decreased pressure; and thus will be maintained a constant supply of steam, at the pressure desired, to each vessel or chamber where the steam is used.

The figure, in Plate VII., represents the apparatus in sectional elevation. *a*, is a valve, interposed between the boiler and the apparatus where the steam is to be used; *b*, a pipe in communication with the boiler, in which the steam is at a higher pressure than that required for a particular purpose; b^1, is a small chamber under the valve *a*; *c*, space over the valve in communication with the pipe *h*, and closed at the top by a cover *d*, of vulcanized India-rubber or other flexible

substance, equal to resist the lower pressure, screwed firmly, and kept in place between the flanges *e*, and *f*; *g*, is a lever, with a weight adjusted to the pressure required; *h*, is a pipe leading the steam from the boiler to the apparatus, where it may be required at a lower pressure; and *i*, and i^1, are nuts, between which the India-rubber or flexible surface is screwed to the shaft or shank of the valve.

The action of the valve is as follows;—Suppose the steam in the boiler and pipe *b*, to be at a higher pressure than is required in the pipe *h*, and the apparatus to which it leads, if there were no lever *g*, it is clear that the pressure of that steam would at once close the valve, and thus prevent any steam from passing into the space *c*, and thence into the pipe *h*; but the lever *g*, being loaded with a suitable weight, will keep the valve down so as to allow the steam to pass from the pipe *b*, to the pipe *h*. As soon, however, as the steam in the pipe *h*, will, together with the pressure on the valve, lift the lever and its weight, the valve will close the passage of the steam between *b*, and *c*, until such time as the pressure in *h*, has again sufficiently diminished to allow the lever and its weight to press down the valve *a*, and thereby re-establish communication between *b*, and *c*.

To JOHN SMEDLEY, *of Lea Mills, Matlock, in the county of Derby, spinner, for improvements in machinery or apparatus for opening, cleaning, blowing, or scutching animal wool, cotton, or other fibrous substances or materials.*—[Sealed 1st April, 1853.]

THIS invention relates to improvements in the construction of the beaters of the blowing-machine. Instead of open beaters, as now generally used, the patentee proposes to employ a drum or cylinder, with blades or projecting knives on the surface; so that, during its revolutions, the said blades or knives strike the cotton or material to be opened, instead of the projecting blades on the arms of the beaters of the present machines. This alteration or modification of the blowing-machine, although simple in appearance, is said to be very efficient in practice.

In Plate VIII., fig. 1, is a front view of the drum or cylinder, which revolves horizontally in the machine, and is provided with blades or knives on the surface; and fig. 2, is an end view of the same. *a*, represents the axles of the drum or cylinder; and *b*, the blades or knives on its surface.

The patentee claims the use of a drum or cylinder with projecting blades or knives for the blowing-machine, as herein described.

To George Fergusson Wilson, *of Belmont, Vauxhall, for improvements in treating certain oily matters and in the manufacture of oil.*—[Sealed 1st April, 1853.]

This invention consists in diminishing or removing the smell and color from the oily matters that are produced by the destructive distillation of resin, and in combining them with the oleine of palm and other neutral oils. The resin oily matters are distilled, or repeatedly distilled, with the air excluded,—the matters, in some cases, being treated with powerful agents, such as sulphuric acid, before this distillation; or they are exposed to heat, to drive off their more volatile part. The purified resin oily matters are mixed with the other oily matters, by means of agitation or boiling up with free steam.

In carrying out his invention the patentee has recourse to a process patented by himself and Mr. Gwynne, 16th November, 1843,* as a preparation for mixing the resin oil with the oleine of palm oil and other neutral oils. The resin oil is first caused to be heated for about four hours, in a close vessel, by means of heated steam,—keeping the temperature to about 350° Fahr.; and it is then to be distilled with the air excluded. According to the state of purity desired to be obtained, the distillation is to be performed again and again; and, for this purpose, steam, heated to a high degree after it leaves the steam-boiler, is employed, as is well understood. If the resin oil be very impure, about 2 lbs. of sulphuric acid are stirred in to 112 lbs. of resin oil. The same is then to be washed in water, and submitted to the process of heat.

Having thus prepared the resin oil, it is to be mixed with a neutral oil; and, for this purpose, the oleine of palm oil is preferred. The best mixture will be found to be in about equal quantities,—but this may be varied; and, in order intimately to mix these matters or oils, they are boiled by the aid of free steam, by which a most intimate admixture is effected; and such combined oils will be found very useful for lubricating heavy machinery.

* See Vol. 23, p. 99, Lond. Jour.

To FRANÇOIS MONFRANT, *of Paris, for improvements in lubricating materials,—being a communication.*—[Sealed 2nd May, 1853.]

THIS invention consists in the employment, for the manufacture of lubricating materials, of all fatty oils (with the exception of coleseed oil), which are dis-acidified by means of milk, and are then caused to blend and intermix with fat or a fatty body, by means of resin or a a resinous composition.

IN preparing the said lubricating materials, the patentee employs a large boiler or heating vessel, heated either by fire, or by steam, hot air, or otherwise. In this vessel, the oil to be operated on is placed, and heated to such a temperature that the hand can just bear it when immersed. The lard or other solid fatty body is then added (care being taken to stir the mixture well with a spatula from this time to the end of the operation); and also resin of the ordinary description, or a resinous body, in the proportions necessary to produce the several compositions hereinafter specified, or other like proportions. When these two bodies are perfectly melted, and an intimate commixture has taken place, pure fresh milk is added, in the proportion of at least two pints for every 100 kilogrammes (220 lbs. about) of oil; and the greater the impurity of the oil, the larger must be the proportion of milk added to it. In the event of milk not being procurable, the same proportion of albumenized water (prepared by adding the white of one egg to a pint of water), or of alkaline water (containing 5 grammes) (3¼ dwts. of crystals of subcarbonate of soda to a pint of water), or even water alone may be used; but milk is, in all cases, to be preferred. The mixture is allowed to be heated to boiling, or until the bubbling, produced by the evaporation of the aqueous matters, has ceased; and, in order to ascertain when the operation has been carried on to a sufficient extent, a slice of new bread is placed in the heating vessel; and, when this is well browned, the operation is complete. It must be observed, that the stirring should be continued throughout the operation; and, in the case of the more solid compounds, even after the boiling is completely finished. When the operation is terminated, as has just been described, the mixture is allowed to repose for several hours, and is then drawn off, before packing it for storage or use, by means of a hand-pump, or a common syphon. The results of the different operations described are, that, by the boiling, all the moisture of the milk, and other foreign bodies, is entirely dissipated as vapour; and that the acid principles of

these substances, combined with the casein of the milk, are rendered insoluble and precipitated, while the oil, separated from the deposit which they form, contains no acid, and the deposit itself is, in some measure, carbonized, and is easily removed from the vessel. All the products, by being boiled together, are thoroughly incorporated; so that there is no danger of the lard and oil becoming separated,—a result to which the resin or resinous body undoubtedly contributes. If the operation is to be carried on continuously, it will be needful to have tinned iron vessels, into which the clear contents of the boiler can be transferred, to cool and settle before being packed away.

The products which are obtained by this mode of operating are of different characters, and suitable for different lubricating purposes, according to the proportions of the ingredients of which they are composed. The following proportions are said to produce superior lubricating materials; but these the patentee specifies rather as guides than as intending to confine himself to them only:—

No. 1.—Compound for the finer carriage-work, &c.—Resin, 2½ per cent. of the quantity of oil. Lard, 50 to 75 per cent. of the quantity of oil, according to the degree of solidity required.

No. 2.—Compound for copper, steel, fire-arms, the more delicate kinds of machinery, &c.—Resin, none; but, instead of it, 2 per cent. of common yellow wax. Lard, 25 to 50 per cent. of the oil employed.

No. 3.—Compound for lubricating oil for machinery.—Resin, 2½ per cent. of the oil employed. Lard, 5 per cent.

No. 4.—Compound for the woollen manufacture, &c.—Resin, none. Lard, 3 per cent. of the oil employed; but, for this purpose, it is indispensable that the lard should be quite fresh.

No. 5.—Compound for paint, oil, &c.—Resin, 1 per cent. of the oil employed. Lard, 2 per cent.

With the addition of the drying material usually employed; say, litharge, 1 per cent.

As before observed, these proportions may be greatly varied. The more lard is used, the harder will be the compound. The weather also affects the proportions to be used, and more lard must be employed in summer than in winter, to produce a like effect. The lard may be composed of half hogs' lard and half mutton or other suet or fatty matter. The lard should be freed from all skin, &c., and cut into small pieces; and it is better also to remove from it any portions of fleshy

matter that may be mixed with it; and if the fatty bodies employed, whether lard, mutton suet, beef suet, or other fatty matter, are used in the raw state, they should be first partly melted before being added to the mixture in the heating vessel, by any of the means ordinarily adopted for such purpose. The products, obtained as before mentioned, can be employed with advantage to replace all the oils employed as lubricators, such as animal oils, lard oil, olive oil, &c. They possess, moreover, the merit of being perfectly unctuous, and of containing no kind of acid; they do not act prejudicially on metals, nor form any residuum through friction; they neither turn rancid from age, nor do they harden from contact with the air; and, lastly, their component parts do not separate from each other, but continue always in intimate commixture.

The patentee claims the manufacture of lubricating materials by the employment of all fatty oils (with the exception of coleseed oil) disacidified by means of milk, and caused to blend and intermix with fat or a fatty body, by means of resin or a resinous composition, as hereinbefore described.

To HENRY RICHARDSON FANSHAWE, *of Arthur-street, Old Kent-road, chemist and manufacturing agent, for improvements in fire-arms.*—[Sealed 16th March, 1853.]

THESE improvements consist in the substitution of the electric or electro-galvanic fluid as a means of ignition to the powder or other explosive compounds employed in fire-arms, in place of the present percussion-cap, flint, or match. In guns, the barrel is adapted to a hollow stock, and in field-pieces and pieces of ordnance, as mortars, bombs, &c., a convenient receptacle is formed in the carriage of such piece, and in both cases galvanic plates are fitted therein to form the battery required. Instead of a lock, a firing tube or needle, which should taper towards its point, is employed; on the larger part of which is placed a flange. This tube should penetrate through the end of the breech of the barrel by a small aperture made through it, and running parallel to the same (to serve in place of the present touch-hole). This tube or needle carries a wire at its point or narrow end: the tube or needle must be lined or coated with a thin film of gutta-percha or other non-conducting substance. At a short distance from the flange of the tube the wire must, for action, be brought in contact with a plate; and between the flange and the plate must be a spring.

The trigger will act upon the flange of the tube or needle, and force it into the charge or cartridge; the wire being gradually brought up to the point of ignition,—that is, the small end of such tube or needle already inserted in the breech in the hollow stock. There is another mode of applying the conductor, which is, by insulating a pointed wire in the same non-conducting substances, and hermetically sealing the opening in the breech of the gun or field-piece: the conducting wire would communicate to this fixed point the fluid, which would by such means ignite the charge. For these arms it will be desirable to use the powder enveloped in waterproof cases, of suitable construction, as hereafter described.

In Plate VIII., fig. 1, exhibits one arrangement of the firing tube or needle, on which the trigger acts, as hereafter described; whereby a point is forced into a cartridge of the peculiar construction shewn at fig. 6, and hereafter described. A, denotes the stem of the point made of brass, or other metal of the same or greater hardness; A^1, the point made of platina, or other incorrodible metal, secured to the stem by being tapped therein, or by hard solder; *b*, the flange on which the trigger acts, as hereafter described; *c*, the helical or spiral spring which surrounds the stem A, and presses at one end against the flange *b*, and at the other against the metallic washer *d*,—having in front thereof a vulcanized India-rubber or oiled leather washer *e*. These should be convexo-concave in form, so as properly to close the concave aperture at the opening of the breech towards the stock.

Fig. 2, exhibits a second method for carrying out this invention, by adapting to the breech of the ordinary barrel of a musket, cannon, or other fire-arm, a fixed point *a*, of a non-conducting substance, such as Wedgwood's ware, round the extreme end of which is laid, in a fine groove, a platina wire *b*, of from No. 30, to 34, wire, according to the description and size of the arm, connected by another and stouter wire *c*, of the same material, joined to a copper wire *d*, of sufficient diameter to carry the current of electricity required; the same being in connection with one of the poles of the battery, by passing through the breech *e*, to the battery. The platina wire *b*, is carried over the end of the fixed point *a*, to a groove on the other side thereof, and terminates at the breech *e*, so as to complete the circuit when in action. In this gun, powder and shot, or ball, may be used loose, but the ramrod must in that case be concaved at the end (as shewn at fig. 7, and hereafter described), so as not to injure the fixed point in the interior of the barrel.

Fig. 3, exhibits an external view, and fig. 3A, a longitudinal section of a third plan of firing tube or needle, which, passing through the breech, and being charged either negative or positive from the battery, ignites the charge by contact at the most profitable point of ignition, viz., that nearest to the shot or projectile, and causes its discharge; the breech being charged with electric fluid from one pole, and the tube or needle from the other. This needle is thus constructed:—Within a brass tube *a*, is a brass wire a^1, insulated by being coated with cotton and shellac *e*, *e*, and proceeding from one pole of the battery, and extending to the platina wire *b*, (shewn by a dotted line) secured to the said brass wire by soldering with hard solder; the said platina wire being laid against a piece of talc *d*, and open to view, as represented by the dotted line, fig. 3. On the other side of this is another shorter piece of talc *d**; and there are two slips of platina *c*, *c*, soldered with hard solder to the brass tube; such slips being protectors to the talc and wire, and for completion of circuit. *f*, is the flange actuated by the trigger; and *g*, the helical or spiral spring (not shewn in the fig. 3A).

Fig. 4, exhibits a modification of the above. *a*, is the outer tube; *f*, the flange for the trigger; and *g*, the helical or spiral spring. In this case the platina wire, shewn by the dotted line, passes between a slip of platina brought to an acute angle or nearly so; and there are no pieces of talc inserted, as in the former case. The other arrangements in this case are the same as in figs. 3, and 3A. Another modification of this may be constructed by inserting the platina wire between Wedgwood ware or other non-conducting substance.

Fig. 5, exhibits a fifth form of firing tube or needle. This has a perforating sheath or tube A, outside the igniting needle *a*, with flanges for the double trigger, shewn at fig. 11. *h*, is the flange on the outer needle, and *f*, that on the inner needle. *i*, is a washer against the end of the tube A, and receiving the pressure of the spring *j*. And there is another helical or spiral spring *g*, which extends to the end of the perforating tube *a*. The other arrangements of the igniting needle *a*, are the same as fig. 3A. This arrangement is said to ensure great certainty in firing large pieces of ordnance and other fire-arms where large and stout cartridges are employed, as the outer points of the perforating tube will readily break the cover or end of such cartridge, and allow the ignition of the powder to take place at the most profitable point, as aforesaid.

The same lock arrangement is applicable to all these shapes, except fig. 5, in which case a lock, such as shewn in fig. 11,

and hereafter described, is required; and, in the case of two-barrelled guns, a duplicate lock will be required; and this may either be regulated upon the common trigger principle, or a key (as fig. 12,) upon a square point in the centre of the two, acting upon a lever, may be made to serve the purpose; which key can at any time be removed, and so render the piece, if loaded, perfectly free from danger from accidental discharge.

Fig. 6, exhibits the cartridge hereinbefore mentioned, suitable for use with the first-described needle. A, is the external view; B, the longitudinal section thereof. *a*, is the powder compartment; and *b*, the shot compartment; *c*, is a disc of copper or other suitable metal, with a bridge *d*, secured thereon by sealing-wax, or other suitable non-conductor; and to this is soldered at *e*, and *f*, a thin platina wire, shewn by the dotted line. This copper disc *c*, has a toothed or jagged edge *h*, projecting outside the cartridge, for firing the same. The felt *g*, is made of hair felt.

Fig. 7, is the ramrod hereinbefore mentioned, suitable for use with the second-described needle. It is hollowed at the head *a*, or larger end, forming a cup, which will fall over the point without injury thereto.

Fig. 8, is a longitudinal section, and fig. 9, is a plan view of a gun fitted according to this invention. A chamber or battery cell is formed by hollowing out the stock of the gun *a**, (or the carriage of a piece of ordnance,) and coating the same with insoluble cement. In this is placed the frame *b*, (see fig. 8,) containing the positive plate C, made zigzag, of platinized silver. On each side and one end is the negative plate *d*. From the positive plate *c*, at *e*, proceeds the positive wire to the metallic plate *f**, in the breech of the gun; which plate is in contact with the positive wire. In order to put the gun in action, and fire it by means of the battery, the electric fluid is communicated to the wire a^1, at the end of the firing tube or needle *d*, by the motion of the trigger D, which acts upon the firing tube or needle at the flange *f*,—pushing forward the firing tube or needle, which draws forward the wire a^1, and, from the curvilinear shape thereof, and the plate *f**, brings them into contact; thereby forming the complete circuit for conveying the electric fluid to fire the charge. *m*, is a valve of vulcanized India-rubber, with a small brass clip and screw for the discharge of any hydrogen which may generate in the battery. The lock arrangement consists and trigger. The trigger being acted on, pushes forward the of a frame of iron *h**, having two cross plates h^1, h^2, with

orifices in the centre, for the passage of the firing tube or needle; and there is an orifice for the same purpose in the front of this frame, facing the orifice in the breech of the gun. Any of the firing tubes or needles, before described, may be used in this lock arrangement, excepting the fifth arrangement; and the action will be this,—that when the needle has been pushed forward, and the charge fired, it will be brought back to the position, shewn in the drawing, by the helical or spiral spring *g*, which works free in the orifices of h^1, and h^2, and the front of the frame, but abuts and acts against the breech *e*. *k*, is the barrel of the gun.

Fig. 11, is a longitudinal section of the lock arrangement, fitted with a compound trigger, and adapted to the use of the fifth arrangement of firing tube or needle. The parts which remain the same as in the former lock arrangement, are marked with the same figures, and need no further comment; the difference between the two consisting in the firing tube or needle being of different construction; viz., the third arrangement of construction as shewn at fig. 5, which, having been described, will need no special reference. It also differs in respect to the trigger, which is a compound lever, the same as the former trigger as regards the part D, but having jointed thereto a horizontal lever D^1, to which is jointed an upright lever or second trigger D^2, having its fulcrum at $\times$. When the trigger D, is acted upon, it impels forward the second trigger D^2, by the intervention of D^1; and D, itself follows it. D^2, acts upon the flange *h*, of the firing tube or needle *a*, and causes the needle to move forward into the breech of the gun, and perforate the cartridge; and after this, the igniting tube *a*, is pushed forward by D, acting on the flange *f*, in the usual way. In order to insure the tube A, being pushed forward before *a*, is pushed forward, and thus allow A, sufficient time properly to perforate and enter the cartridge, the spring *j*, is made considerably weaker than the spring *g*; and the return of both A, and *a*, will be in the same proportion.

Fig. 10, is an external side view of the fixed point or firing needle hereinbefore referred to, with its mechanism. D, denotes the trigger which acts against the flange E, on the tube F, through which passes the insulated positive wire *d*, connected with the fixed point, as shewn at fig. 2, and hereinbefore described. G, G, are guides, formed on the plate H, fixed on the side or other convenient part of the gun. The tube F, is insulated from the spiral spring, from the framework tube F, to the end of the breech, and completes the circuit by coming in contact with that negative pole; the negative wire I, having supplied F, at the moment of contact.

A duplicate arrangement of fig. 10, will apply to a double-barrelled gun of this fixed point.

The patentee remarks that he prefers using, in the said battery, feathery asbestos and dilute sulphuric acid, made of one part acid and four parts water,—taking care that these and the other materials used in the construction and working of the battery shall be as pure as can be procured; his object being to keep the battery efficiently at work, without a fresh supply, as long as may be, and to defer the destruction of the materials to as great a distance of time as possible. The cover of the battery is secured so as to prevent the escape of the asbestos paste; and the small vulcanized India-rubber tube ( ), which acts as a valve, is occasionally opened, for the discharge of any hydrogen which is formed during the electrical action: where the zinc is pure and well amalgamated with mercury, and the sulphuric acid is free from impurities, the quantity of gas generated is very small, being only generated at the instant of each discharge of the piece. The wires being adjusted, and complete circuit of battery ensured, if the second-described point is employed, the cartridge or loose powder is put in at the mouth of the gun-barrel, together with the ball or shots, in the usual manner. But it is preferred, in all cases, to load at the breech, as this plan is most conveniently worked with the American, Prussian, and other guns, so loaded. After placing the charge, whether loose or cartridge, or a hollow shot, such as Norton's patent elongating ball, the explosion is caused by forming a complete electrical current to meet at the nearest point of the powder next or in contact with the ball or shots.

In carrying out this principle in large guns, or for submarine operations, a larger amount of battery action will be required, as the point of ignition will lie a much greater distance from the plate than in the case of small arms.

The patentee claims the improvements in fire-arms of the nature and character hereinbefore set forth and described.

To Edward Onslow Aston *and* George Germaine, *both of Millwall, in the county of Middlesex, master mariners, for improvements in compositions for coating wood, metal, and other materials exposed to the action of sea-water or the weather.*—[Sealed 23rd April, 1853.]

This invention refers to mineral compositions, prepared principally from sulphur and salts or oxides of copper, which are

to be applied, while in a hot liquid state, to metal, wood, stone, cement, and other materials; being used for wood ships in lieu of coppering, and for iron ships instead of the usual anti-corrosive paints and other ingredients employed for coating the same; and may likewise be used as a preventive of the action of the weather or sea-water generally, by coating the surfaces of the exposed materials therewith.

The details of the process, and the mode of using the mineral preparations are described as follows:—

"We melt together, and thus combine in variable proportions, sulphur, naphtha, and creosote; adding thereto verdigris or acetate of copper. Sometimes we substitute for verdigris copper pyrites, artificial sulphurets of copper, blue vitriol or sulphate of copper, and other combinations of copper with acids or oxygen, either singly or mingled, being first properly ground. The sulphur, naphtha, creosote, and sulphuret or salt or salts of copper, singly or combined, are to be heated together and well stirred; after which, the composition resulting therefrom may be poured out into suitable moulds, and, when cold, broken up and packed in a dry hard state, ready to be remelted when wanted for use.

"One of the various preparations that may he thus compounded is made by fusing in an iron pan, or any convenient vessel, three parts by weight of sulphur, and adding one part of naphtha heated in a separate pan. When these materials are thoroughly incorporated, one pound of acetate of copper or verdigris is to be added to every eight pounds of the composition, and well stirred into it; after which it may be run into moulds, cooled, and stored for use. Or, the sulphur being melted, the verdigris may be added, then the naphtha, and afterwards the creosote, at a boiling heat, to secure the amalgamation of the materials. The same process will apply to the adding of pyrites, they being first well pulverized; and to the salts and oxides of copper generally; all which may be used in variable proportions according to the quality required.

"To coat iron with any of our improved mineral compositions, we recommend the surface of the iron to be first well cleaned by scraping, and then rubbing it over with a stiff brush repeatedly dipped in hot naphtha. When a sufficient surface has been thus prepared, a pot of the hot composition is to be provided and spread over the prepared iron, as customary in using pitch. When the sides and bottom of an iron vessel have thus to be prepared, the iron must be first freed from all moisture by common rubbing and firing, or in some cases simply by sanding or dusting it over with any

dry ashy absorbent powder; the iron will then be ready for cleaning with the hot naphtha, before laying on the mineral composition.

"To coat wood, and particularly wood ships' bottoms, the surface should be scraped clean, then coated with a boiling compound of naphtha and creosote, preparatory to applying the mineral composition, the surface of which may be afterwards smoothed with suitable hot irons.

"Our mineral compounds may be applied to dry surfaces, with or without the first application of hot naphtha, particularly when used for buoys, piles, and all common out-door work; and for roofs to guard them against either moisture or the attacks of insects.

"For ships' bottoms, and all exposed iron or wood marine work, these compositions will be found to preserve them from the sea worm, and the adhesion of animal and vegetable products common under such circumstances, in consequence of the well known action of the mineral poisons."

The patentees claim the use of sulphur combined with any oxides, sulphurets, or salts of copper, for the purposes herein described.

To Farnham Maxwell Lyte, *of Florian, Torquay, in the county of Devon, for improvements in obtaining iodide of potassium, when treating certain metals.*—[Sealed 26th July, 1853.]

This invention consists in the discovery that when the chlorides or some soluble salts of certain metals are placed in contact with solutions containing mixed iodides and chlorides, double decomposition ensues, and insoluble metallic iodides are formed, and that, by continuing the addition of the chlorides, this continues so long as any soluble iodide remains in the solution: also, that the insoluble iodide can afterwards be converted into a metal, and a soluble iodide, by any of the processes in use at present for the decomposition of metallic chlorides, as in refining silver. For instance, the patentee refines silver, and at the same time produces iodide of potassium from such solutions as bittern, or matters which contain these mixed iodides and chlorides. Having dissolved the silver in nitric acid, and precipitated it with a soluble chloride, as chloride of silver, he divests it of copper by washing with water. He then projects the chloride, so produced, into the solution of mixed chlorides and iodides, and continues the addition, with frequent stirring, till, on

adding a portion of the chloride of silver to a test sample of the liquid, it ceases to become yellow. Then, to insure all the silver being converted into iodide, he adds a very small portion more of the mixed salts, so that there may be a small excess of iodine in the solution, rather than a trace of chlorine in the precipitate. The addition of ammonia facilitates the decomposition; so also does heating the liquid. The iodide of silver thus produced is converted into iodide of potassium, and metallic silver, by projecting it, when completely dessicated, into a crucible containing fused carbonate of potassa, according to the method now in use for the reduction of the chloride; but, by this process, iodide of potassium is formed, instead of the chloride as formerly,—a valuable product, instead of a product of little value.

By adding a soluble salt of lead to the mixed salts till all the iodine is precipitated, and decomposing the iodide thus formed by the same method, iodide of potassium is formed, which may be dissolved and purified by re-crystallization.

The periodide of mercury (a most splendid pigment) is produced by adding the bichloride of mercury to the mixed salts.

By these methods all the iodine is recoverable from the mixed salts; whereas, by the old process generally used, a great deal was lost as chloride of iodine.

The patentee claims the mode of treating mixed salts with certain metals, and manufacturing iodide of potassium, as herein described.

To John Lee Stevens, *of King William-street, in the City of London, civil engineer, for improvements in grates and stoves.*—[Sealed 17th May, 1853.]

These improvements consist in the admission of currents of hot air behind the backs or back-plates of grates or stoves about or above the level of the fire; which currents of air pass in channels or passages formed underneath or at the sides of the fire, and are partly heated thereby, and partly by the backs or back-plates of the grates or stoves; and the object thereof is the better combustion of the gases arising from the fuel used in such grates or stoves, as well as to reduce the formation of smoke, and concurrently to increase the draught of the chimneys or flues.

In Plate VIII., fig. 1, is a transverse section; fig. 2, a horizontal section; fig. 3, a vertical section; and fig. 4, a back or back-plate of a sitting-room grate or stove. *a, a,* are the

grates or fire-bars; *b, b,* and *f, f,* backs and back-plates of the grates; *c, c,* and *d, d,* are channels or passages; *e, e,* guards to deflect the heated air, and to prevent the fuel from closing the air passages; and *i, i,* spaces leading to the backs or back-plates *b,* and *f,* within which the air is partially heated underneath the fire.

Fig. 5, shews the application of the invention to a kitchen grate or stove, which may be modified by adapting the parts *b,* and *f,* and the air passage *c,* to the side of the fire-place; when the flue takes off at the side instead of the back.

Fig. 6, shews the application of the invention to an oven-grate; and fig. 7, to a copper pan or still-grate; in each of which the parts *b,* and *f,* may be cast together when not made of wrought-iron: *h, h,* are the fire-places.

Fig. 8, shews the application of the invention to a boiler-grate,—*g, g,* being studs to keep the back at the proper distance from the brickwork or bridge *k,* when such back is not connected with the back-plate *f,* as shewn in previous figures.

It will be obvious, that the invention can be applied to or with other grates than those particularly described; and where the heat is likely to be so intense as otherwise to melt the iron, the back or back-plate should be protected with fire-bricks or lumps in front, as shewn in figs. 6, and 7.

The patentee remarks, that hollow bridges have been before employed for similar kinds of grates; but, in such cases, they have not been formed with the inclined plates *b,* descending below the grate *a,* so as to become heated, and thereby give off heat to the air passing upwards, in the manner described.

By the foregoing arrangements it will be seen that the parts indicated, being necessarily heated by the action of the fire, must proportionately increase the temperature of the air in the air passages or channels through which it ascends; and, by that means, supplies of heated oxygen are caused to mix with and assist the combustion of the gases arising from the fuel of the respective fires; thereby effecting a corresponding prevention of the formation of smoke; or, by the greater rarification of such currents of air, contributing to improve the draught of the chimneys or flues used in connection with the said improvements in grates and stoves.

The patentee claims the combinations herein shewn and described.

To THOMAS WEATHERBURN DODDS, *of Rotherham, in the county of York, engineer, for improvements in the manufacture of wheels and axles.*—[Sealed 7th March, 1853.]

THIS invention relates to the construction of wheels and axles, suitable for railway purposes, as well as for ordinary road work, in such manner that very superior strength may be secured in such details. In making the improved wheels, the malleable iron, or the raw material of the tyres, is primarily rolled out into long strips or bars, and these bars are then coiled up into a helix, or volute, and the folds or contact surfaces are rolled or hammered together at a welding heat, for the thorough incorporation of the metallic layers; so that in this way the thickness or transverse section of the tyre is welded into a homogeneous mass throughout, instead of having merely a single weld at one point of the circle. And, in combining the details of the improved wheels, the tyres are rolled with longitudinal side flanges on the inner surface, for the reception and holding up of the outer ends of the spokes or wheel arms. The nave or boss of the wheel is of a conical shape, and the inner ends of the spokes or arms are correspondingly bevilled; so that when the latter are laid round the nave, the cone is drawn up laterally, by means of a plate on the wheel face, fitted with adjusting bolts; and the cone action then forces out all the arms or wheel spokes in a radial direction—bringing their outer ends to bear hard up against the interior surface of the tyre, and binding the whole wheel into a solid mass. The spokes may either be of iron, or wood, or other material; and they may be arranged to produce a wheel either solid, or nearly so, or open-spoked. When wood is adopted for the spokes, the pieces are first suspended over boiling tar, or bitumen, so as to be subjected to the effect of the ascending vapour, which acts as an excellent preservative against decay, from chemical causes; or, instead of this system of treatment, the wood may be boiled in a composition of red lead and bitumen. In fagotting up the improved axles, the separate pieces, out of which the required solid axle is to be produced, are individually rolled or shaped with a species of duplex or other incline of a like character; so that when the pieces are laid together, they dovetail, or combine with each other, in such manner that, when rolled or laid under the hammer, the rolling or hammer action forcibly combines all the contiguous or contact surfaces together, and effects a good metallic binding down to the centre of the incorporated mass. This is the system of construction to be followed in the manufacture of solid axles; but

hollow axles are made in the same manner, modified only as regards the leaving a tubular centre in the mass.

In Plate VIII., fig. 1, is a side elevation of one of the improved railway wheels, fitted with wooden spokes or segmental pieces of timber, so as to form a nearly solid wheel; and fig. 2, is a corresponding transverse section of the same. Fig. 3, is a transverse section of a tyre-bar, detached, and slightly modified from the usual form. Fig. 4, is a side elevation of a complete wheel, with wrought-iron spokes or segmental pieces made on the same general principle as the wooden spoked wheel; and fig. 5, is a side elevation of the nave or wheel boss, with its adjusting or binding plate removed. Fig. 6, is a partial side elevation of a carriage wheel, as made for common roads; and fig. 7, is a transverse section of the same. Figs. 8, and 9, are two different transverse sections of wrought-iron axles, shewing the mode in which the several component parts are laid and rolled together. Fig. 10, is a transverse section of one modification of wheel-tyre, as laid or rolled together in a volute form; fig. 11, is a similar transverse section of a tyre, wherein the bar of metal is formed into a volute; and fig. 12, is a transverse section of a tyre of the boxed class, in which the helix and volute are combined. Fig. 13, is a side elevation of a tyre, rolled up or folded as a volute; fig. 14, is a transverse section of the same; and fig. 15, is a transverse section of an entire tyre, as formed from a bar rolled up as a helix.

In constructing the wooden armed wheel, figs. 1, and 2, the nave *a*, is cast or formed with an inside disc-flange *b*, as the side retained for the inner ends of the arms or segments *c*; and from the inner face of this flange the nave is coned or tapered towards the outside of the wheel, as it stands in position under the engine or carriage; the taper being from *d*, to *e*, where it terminates in a narrow square shoulder. From this shoulder to the end of the nave, or outer face, the nave is continued of a cylindrical section, which part is embraced by the adjusting plate *f*. The tyre of the wheel is made with an internal recess *g*, so as to leave side shoulders to retain the outer squared ends of the arms *c*. With the parts thus arranged, the workman lays the arms in their places, to abut between the outside of the nave and the interior of the tyre; and the plate *f*, being then shipped on to the outside collar-piece of the nave, the retaining bolts are passed through the ring of holes formed in the plate *f*: the inner ends of the arms, and the inside disc-flange *b*, and the nuts *h*, of these bolts, are then tightened up. The result of this is, that, as the bolts are severally made to bind the plate *f*, down upon the spokes, the

cone or incline *d, e,* acts upon the correspondingly-inclined inner ends of the spokes, and produces a firm and intimate bearing between the nave and the tyre, and completes the solid wheel. In using a common tyre, as in fig. 3, the inner face is turned with a slight outer shoulder *a*; and from this part the face is inclined towards the opposite side, as from *b*, to *c*,—the diameter across the whole tyre at *c*, being the widest. And, instead of drilling the holes *d*, for the holding screws, quite through the thickness of the tyre, it is preferred to put in the screws from the inside, without passing them through the metal. Thus a neater piece of work is made, whilst the tyre is not weakened. A similar system of construction is followed in making the wrought-iron spoked wheel, figs. 4, and 5. Each spoke *c*, is, in this instance, made up of a pair of parallel bars of metal; but the spokes or arms may be of any form; the system of attachment being available for nearly every kind of spoke. In the wooden-spoked carriage-wheel, figs. 6, and 7, a segment of the boss is supposed to be removed at *a*; and the part *b*, represents a section through one of the segments. The nave or boss *c*, is formed with a cone *d*, as before described; and the inner ends of the wooden spokes are clamped, and secured by the lateral pressure of the plate *e*, set up by the ring of bolts *f*, against the abutting disc-flange *g*. The inner end of each spoke *h*, is tapered and fitted into a correspondingly-morticed segment of metal, as at *b*; each pair of spokes having a separate segment apportioned to them. These segments are built round the cone of the nave; and these metal surfaces receive the actual adjusting pressure of the plate *e*; the outer surfaces of the felloes *i*, being forced well into the internal recess in the wrought-iron tyre *j*, to bind the wheel into a solid mass. In the transverse section of the wrought-iron axle, fig. 8, the axle is shewn as built up of eight separate pieces of metal, of a species of wedge form; each having three distinct inclines on each side, *a, b, c, d, e, f*. In fig. 9, each piece has two inclines on each side, *a, b, c, d*. These inclined junction surfaces may be variously modified, so as still to preserve the special effect desired; that is, the mutual thorough binding together of the contiguous surfaces, under the hammer or in the rolls. In the section of the volute folding tyre, fig. 10, the folds are shewn as in the act of being incorporated into a solid mass; the straight bar being primarily rolled out to the section of the external fold *a*; so that when the bar is coiled up, and hammered or rolled into a solid mass, each fold or layer of metal is flattened out, and a dovetailed recess is thereby formed

on the inner side of the piece. In folding up, each recess fits over and embraces a corresponding projection on the other surface of the metal; thus binding the parts together, as at *b*. In the helically-folded tyre, fig. 11, the inclines *a*, bind into one another; and hence any defects in welding are in a great measure prevented from opening up the metal, whilst the general solidity of the mass is increased. In the section, fig. 12, combining both the helical and volute folds, the inner portion of the tyre is composed of a rectangular bar folded up into a helix *a*; and these folds are firmly bound together by an external box or trough-piece *b*, which has side flanges *c*, to embrace the mass of folds. The actual appearance of the side view of a volute folded tyre is delineated in fig. 13; and fig. 14, is a corresponding transverse section, shewing that a plain rectangular bar is used with tapered ends. Fig. 15, shews a plain rectangular bar helically folded to produce a similar effect. Wheels of this improved construction may be made with ordinary tyres or axles.

The patentee claims, First,—the general arrangement and construction of wheels and axles, as above described. Second,—the system or mode of binding or adjusting together the detailed parts of wheels by means of coned or inclined surfaces on the bosses or naves of such wheels. Third,—the application of conical or inclined bosses or naves for binding the spokes, arms, or segments up inside the tyres. Fourth,—the system or mode of manufacturing or forming tyres from bars coiled up so as to furnish a continuous welding surface throughout the length of the coil; the contiguous surfaces of the folds being held together by dovetails or inclines. Fifth,—the system or mode of manufacturing tyres by a combination of the volute and helical coils. Sixth,—the system or mode of retaining the folds or coils of tyre-bars together, by the use of an external flanged or boxed piece. Seventh,—the system or mode of making axles from a combination of pieces individually formed with duplex or multi-angled inclines, so as to dovetail or bind well together. Eighth,—the application and use of the vapour of heated tar or bituminous matter for the preparation of the wood used in the construction of wheels. Ninth,—the treatment of the wood used for wheels, by boiling or steeping the wood in a compound of red-lead and bituminous matter.

To John Smith, *of Uxbridge, for improvements in machinery for raising and forcing water and other fluids.*— [Sealed 23rd February, 1853.]

This invention of improvements in pumps consists of a metal circular trough or groove answering to the barrel or chamber of an ordinary pump, closed or covered by a water-tight diaphragm of some flexible material, which at any convenient part of the circle is stopped or fastened down to the hollow of the trough or groove. Two openings are made, one on each side of this stop. One or more rollers, mounted upon arms radiating from a central shaft or axis, are caused to travel round in the circular groove or trough, pressing down the flexible diaphragm; when the fluid which is drawn in through the opening on that side of the stop from which the roller is moving, will be forced out at the opening on the other side of the stop towards which the rollers are advancing. In this machine no valves are required, and the rollers may be turned either to the right hand or to the left,—one of the two openings always acting as the feed-pipe,—the other the delivery pipe, according to the direction in which the rollers are turned.

In Plate VII., fig. 1, is a sectional elevation of a machine for raising and forcing water and other fluids, constructed according to this invention. *e, e,* is the circular groove, covered and closed by a flexible elastic diaphragm *g, g*; a portion of which is fastened down to the groove by a radial stop, which effectually cuts off the communication between the two sides. *h,* is a central axis or spindle having three radial arms *i, i, i,* upon which are carried three rollers *k, k, k.* On turning the handle h^1, the rollers will successively pass over and press down the diaphragm *g,*—driving out the air from the groove *e.* After the passage of every roller, the return of the diaphragm *g,* to its original flat position, has a tendency to form a vacuum in the groove: the consequence is, that the water or other fluid rises in the feed-pipe *l,* and occupies the space or opening in the groove between the rollers, until it approaches the radial stop before mentioned; when the fluid is forced through an opening at the back of the groove up through the delivery-pipe *m,* and a continual flow of the liquid takes place as long as the rotary motion is maintained.

When considerable power has to be applied, as in raising water to great heights, or delivering it in the form of a jet, a modification of this machinery is used, as shewn at figs. 2, 3, and 4. Fig. 2, shews the form and position of the groove e^2, e^2, with the stop *f,* between the inlet and outlet passages

l, and *m*. Fig. 3, is a sectional plan of the passages *l* and *m*, and stop *f*. In fig. 4, which is a sectional elevation, the whole arrangement is more clearly shewn: e^2, is the groove; g^2, the flexible covering, which in this case is not elastic, but is strengthened by a circular metal plate or ring g^3, corresponding to the sectional plan of the groove e^2: *h*, is a central shaft or axle, having a projecting arm *i*, which carries the single roller *k*. On rotatory motion being given to the shaft *h*, the roller *k*, travels round, pressing down the ring g^3, and flexible diaphragm g^2, into close contact with the groove *e*, and driving any air or liquid that may be contained in the groove out at the delivery orifice *l*; at the same time the opposite side of the ring g^3, is raised, and a fresh supply of fluid continually enters through the inlet orifice *m*; or *vice versâ*, if the handle is turned in the opposite direction,—so long as the motion is continued. Although, as hereinbefore stated, no valves are required, yet in some cases valves may be used with advantage; as, for instance, in the event of the rollers not pressing the flexible diaphragm down to the bottom of the groove,—when the addition of valves to the inlet and outlet passages would prevent the loss of water that might otherwise take place. Any of the usual forms of pump-valves may be applied to these machines.

The patentee claims the construction of machines for raising or forcing water or other fluids, substantially as hereinbefore described.

To James Pigott Pritchett, the younger, *of the City of York, architect, for improvements in window-sashes and shutters.*—[Sealed 2nd September, 1853.]

This invention relates to that description of shutter and window-sash, the parts of which are suspended by cords or chains that pass over pulleys above the shutters or sashes, and are counterbalanced by means of weights attached to the other end of the cords or chains.

By this improved arrangement, one part or half of the shutter or sash is caused to counterbalance the other part or half. This is effected by suspending the two parts of the sash or shutter from the ends of the same cords or chains; so that when one part of the shutter or sash, such as the lower half, is raised, the upper part will be caused to descend, and *vice versâ*. The shutters or sashes will, by this means, be made to meet half way, and thus form a butt-joint. The two parts of the shutters may thus be made to work in the same

groove, and form a neater joint than when worked in separate grooves. Window-sashes may also be made to work in the same groove; but it will sometimes be found more convenient to mount them, as at present, in different grooves: when they are connected together, and counterbalanced in the way proposed, it will be seen that the lower part of the window cannot be opened without opening the upper part at the same time.

The same counterbalancing principle may be applied to roller shutters made of iron; in which case one half of the shutter must be attached to the upper roller, and the other half to the lower roller. The counterbalance is effected by means of a cord or chain; one end of which is wound round one roller and the other end round the other roller; so that, when the shutter is either opened or closed, the cord may unwind from one roller and wind on to the other.

In Plate VII., fig. 1, is a transverse vertical section taken through a window, shewing the shutters in their boxes when out of use; and fig. 2, is a longitudinal section, shewing the manner of connecting the two shutters or sashes together, by one cord on each side. *a*, *a**, are the upper and lower halves of the shutter, which are made to run in the same groove; and *b*, *b**, are the upper and lower window-sashes. At the top of the upper shutter, on each side, and at the bottom of the lower shutter also, on each side, are fixed, in any convenient manner, arms *c*, *c**; to the ends of which are secured the cord *d*, which passes from the lower shutter up the box *e*, over the pulley *f*, at the upper part thereof, and is secured to the end of the arm *c*, of the upper shutter. The window-sashes are hung in precisely the same manner; and both sashes and shutters are made to meet in the centre, as shewn at fig. 1. It will now be understood, that as both shutters and sashes are suspended from the same pulley and cord, when the lower one is raised, or the upper one lowered, the other one will be raised or lowered simultaneously, and the sashes or shutters opened or closed, as the case may be. The principle of a counterbalance suspension may be applied to sashes of the ordinary construction, even when hung in separate grooves, as will be seen by referring to fig. 3; but, in this instance, it will be seen that no box or case will be required to receive the upper and lower sashes when they are separated by opening the window, as when the window is opened, the sashes will pass in front of each other, as usual.

The patentee claims the arrangement herein shewn and described, or any mere modification thereof, of hanging or

suspending shutters or sashes so that the parts thereof may be made to balance each other, and act simultaneously with greater ease and less friction than when hung separately, as is usually the case,—such suspension being effected by means of cords, chains, or ropes, passed over pulleys placed in the side boxes of the window-frames, so as to be out of sight, as described.

To William Gossage, *of Widnes, in the county of Lancaster, for improvements in obtaining certain saline compounds from solutions containing such compounds.*—[Sealed 15th June, 1853.]

This invention consists of certain improved means for obtaining saline compounds from solutions containing carbonate of soda and other compounds of soda, such as are present in soda liquors, obtained by the lixiviation of soda ash or of rough soda (commonly called "black ash") with water. Also for obtaining a saline compound or saline compounds from solutions containing sulphate of soda, either alone or in mixture with common salt.

In the manufacture of alkali produced from common salt, (as this manufacture is usually conducted) soda liquors obtained by the lixiviation of soda ash, or of black ash, are concentrated by evaporation in iron pans, so as to cause salts to be deposited from such liquors; and the salts so deposited, with the mother liquors remaining, are removed at intervals from the evaporating pans. The requisite heat is communicated to the liquors in the pans, either by conducting flame and heated air over the surface of the liquors, or under the bottoms of the pans. When heat is applied to the bottoms of the pans, these are exposed to injury in consequence of salts (accumulated thereon) preventing the transmission of heat to the liquors. The present improvements consist of certain arrangements of pans and apparatus, and methods of working with the same, by means of which the deposition of salts from the liquors hereinbefore mentioned is effected in pans to which no heat is applied, in place of such deposition being allowed to occur in the pans to which the requisite heat is applied.

These improvements also comprise the use of streams of air passing through such solutions. In Plate VII., fig 1, shews a vertical section of two iron pans, suitably arranged for the improved method of working; and fig. 2, is a separate view of one portion of the apparatus. *a*, is a pan containing

liquor from which saline compounds are to be obtained. Heat is applied to the bottom of this pan, either by special fires adapted thereto, or by waste heat, conducted from furnaces. *b*, is a pan to which no fire heat is applied. This pan also contains liquor of the same kind as is contained in the pan *a*. *c*, is a channel of communication from *a*, to *b*. *d*, is a channel of communication from *b*, to *a*. *e*, is a paddle-wheel, which, being caused to revolve by suitable mechanical means, occasions the liquor contained in the two pans *a*, and *b*, to circulate in the direction shewn by arrows. *f*, is a vessel, by means of which streams or bubbles of air are caused to ascend through the liquor contained in the pan *b*. This vessel is supported about three inches above the bottom of the pan *b*. It has a series of notches *g*, *g*, cut in its lower edge on each side of the vessel (as shewn in fig. 2), through which streams of air pass into the liquor. A supply of atmospheric air is obtained by means of a forcing pump (driven by suitable means), which is connected with the vessel *f*, by the pipe *h*. *i*, is a cock communicating from a reservoir containing suitable liquor for supplying the pan *a*.

In working with this apparatus, heat is applied to the pan *a*, until the liquor contained therein has acquired such degrees of concentration and of temperature, that it will deposit salts upon its temperature becoming reduced only a few degrees. The paddle-wheel *e*, is then caused to revolve in the proper direction, which occasions liquor to be withdrawn from the pan *b*, to *a*; and at the same time a corresponding volume of hot concentrated liquor is caused to flow from *a*, to *b*. This hot concentrated liquor becoming cooled in the pan *b*, deposits a portion of the salts it previously held in solution, and the cooled liquor flows from *b*, into *a*, wherein it becomes again heated and concentrated by evaporation, and again flows into *b*, to deposit a further portion of salts. This circulation being kept up by the revolution of the paddle-wheel, the cooling of the liquor in the pan *b*, is accelerated, and at the same time a further evaporation of water is obtained therefrom, by injecting streams of air through the liquor in the pan *b*, by means of the air-pump connected with the vessel *f*. The speed of the paddle-wheel *e*, and the supply of fresh liquor through the cock *i*, is regulated in such manner that the hot concentrated liquor flowing from the pan *a*, shall not be sufficiently strong to deposit salts at the temperature of the liquor in such pan, but shall be in a condition to deposit salts on being slightly cooled. The salts deposited in the pan *b*, are removed at intervals.

Fig. 3, is a plan view of a series of iron pans and apparatus arranged suitably for working according to these improvements. These pans are all placed on the same level. *a, a,* are two pans, to which heat is applied by special fires or by waste heat from furnaces. These pans communicate with each other by a channel *a**, and are connected with a cooling pan b^1, by means of a channel *c*. The pan b^1, is connected with a heating-pan *e*, through the channel *d*; and the pan *e*, is connected with the cooling-pan b^2, by the channel *e**. The cooling-pan b^2, is connected through the channel *g*, with the heating-pan *j*; and this is connected through the channel *h*, with the cooling-pan b^3, which is connected through the channel *k*, with the heating-pan *l*. This pan *l*, communicates through the channel *i*, with the cooling-pan b^4; and this cooling-pan communicates through the channel *m*, with the heating-pan *n*, which communicates through the channel *n**, with the cooling-pan b^5, from which liquors are allowed to flow through a channel *p*. Each of the cooling-pans b^1, b^2, &c., is provided with a vessel f^1, f^2, &c., for distributing streams or bubbles of air through the liquor contained therein. These vessels f^1, f^2, &c., are of the same construction, and have the same adaptation as the air-distributing vessel shewn at fig. 1. They are connected with an air-pump by means of the pipes h^1, h^2, &c. i^1, i^2, &c., are cocks communicating with a reservoir containing suitable liquor, through which a supply of liquor can be conveyed to the heating-pans. Heat is applied to each of the heating-pans by means of special fires adapted thereto, or by means of waste heat conducted from furnaces. In commencing to work with this set of apparatus (all the pans having been supplied with liquors from which saline compounds are to be obtained), heat is applied to each of the heating-pans; and when the liquor contained in the pans *a, a,* is found to have acquired such degrees of concentration and of temperature that it will deposit salts when its temperature is reduced only a few degrees, a further supply of liquor is introduced into the pans *a, a,* through the cocks *i, i*; which introduction occasions a flow of hot concentrated liquor through the channel *c,* into the cooling-pan b^1: at the same time streams or bubbles of air are impelled through the liquor in the pan b^1, so as to accelerate the cooling of the liquor, and promote evaporation of water therefrom. Salts become deposited from the liquor in the pan b^1, and cooled liquor flows therefrom through the channel *d,* to the heating-pan *e,* and, becoming heated and concentrated therein, it flows into

the cooling-pan b^2, wherein it is subjected to streams or bubbles of air passing from the vessel f^2. The liquor, in its passage through the pan b^2, having become cooled and deposited salts, flows through the channel g, into the heating-pan j; and, becoming heated and concentrated therein, it flows from such pan into the cooling-pan b^3, wherein it is subjected to streams or bubbles of air passing from the vessel f^3, and is caused to deposit salts. It thence flows through the channel k, into the heating-pan l, and, becoming heated and concentrated therein, it flows from such pan into the cooling-pan b^4, wherein it is subjected to streams or bubbles of air passing from the vessel f^4, and deposits salts in the cooling-pan. Thence it flows through the channel m, into the heating-pan n, and, becoming heated and concentrated therein, it flows from such pan into the cooling-pan b^5, wherein it is subjected to streams or bubbles of air passing from the vessel f^5, and again deposits salts: the remaining liquor flows through the channel p, into some convenient receptacle.

By means of the cocks i^1, i^2, &c., such a supply of fresh liquor is introduced into each of the heating-pans (when required) that the hot concentrated liquor flowing from such pans shall not be sufficiently strong to deposit salts at the temperature of the liquor in such pans, but shall be in a condition to deposit salts on being slightly cooled. In the specification of a patent, granted to the present patentee, 8th May, 1853, certain processes or operations are described, in which different saline compounds of soda contained in "black ash liquors" became separated from each other. The arrangement of the series of pans and apparatus, shewn at fig. 3, is suited for effecting the separation of different saline compounds of soda contained in such liquors. In employing such a series of pans and apparatus for obtaining different saline compounds of soda from black ash liquors (previously deprived of sulphuret of iron) containing carbonate of soda, caustic soda, and ferro-cyanide of sodium, it is found that the salts deposited in the cooling-pan b^1, consist almost entirely of carbonate of soda; and such salts, after being drained and subjected to a slight filtration of water, or of a solution of carbonate of soda through the same, will yield soda ash of good quality. It is also found that the salts deposited in the cooling-pan b^2, although consisting, for the most part, of carbonate of soda, contain a notable proportion of caustic soda and of ferrocyanide of sodium. These salts are transferred to the cooling-pan b^1, wherein the salts become deprived of nearly all the

caustic soda and ferro-cyanide of sodium previously mixed therewith. It is likewise found that the salts produced in each succeeding cooling-pan become more and more impregnated with caustic soda and ferro-cyanide of sodium; and the salts produced are transferred in the pan b^5, to the pan b^4, and from the pan b^4, to the pan b^3, and so on.

The salts are thus transferred through the different cooling-pans, in succession, till they arrive at the cooling-pan b^1, whence they are transferred with the salts produced in such pan, and, by slight washing, are rendered suitable for the production of good soda ash. Caustic soda and ferro-cyanide of sodium (previously contained in the liquor employed) become thus concentrated in the liquors flowing from the cooling-pan b^5; and these liquors are subjected to the processes or operations for separating such compounds therefrom, which are described in the specification of the above-mentioned patent. When these improvements for obtaining sulphate of soda and common salt separately from solutions containing such saline compounds of soda are employed, it is found that the deposition of each salt separately is affected by the relative proportion of the salts present in solution; also by the temperature of the solution at which the deposition of salt takes place. Thus, when operating on a solution containing three parts of sulphate of soda for each one part of common salt, it is found that the salts deposited in the cooling-pan consist almost entirely of sulphate of soda; but when the solution contains nearly equal proportions of sulphate of soda and common salt, and the temperature of the solution in the cooling-pan is reduced by streams of air, or otherwise, to about 92° Fahr., the greater part of the salts deposited consists of common salt; and the solution or mother liquors remaining after such deposition being concentrated by passing through a heating-pan, and its temperature subsequently reduced, by streams of air or otherwise, to about 80° Fahr., the greater part of the salts deposited consists of sulphate of soda. By this mode of working, sulphate of soda can be obtained from solutions (containing also common salt) of sufficient purity to be suitable for the manufacture of alkali.

The patentee claims an arrangement of apparatus for obtaining saline compounds of soda from solutions produced by the lixiviation of soda ash or black ash; also, sulphate of soda from solutions containing such compound of soda; which arrangement of apparatus provides for such compounds being deposited from hot saturated solutions containing the same, by cooling such solutions in a pan or vessel; which pan or

vessel is so connected with the pan or pans employed for heating and concentrating such solutions, that a continuous flow of such solutions can be maintained through the same. He further claims the passing of streams of air through such hot solutions contained in such cooling pans or vessels, for the purpose of cooling the same, and causing evaporation of water therefrom.

To JOSEPH ILSLEY, *of Lisbon, Portugal, professor of physics, for an improved telegraphic apparatus.*—[Sealed 16th June, 1853.]

THE object of this invention is to supersede the use of the electric or magneto-electric current for working telegraphic signals, and to employ in place thereof a column of air, which is to be confined in a tube or pipe extending from one station to another. To this tube or pipe, which may be placed under ground, is to be adapted an air-pump, syringe, or other suitable apparatus, whereby the column of air may be rarefied and compressed, or otherwise acted on, and made to actuate a signal or indicating apparatus placed at opposite extremities of the tube. Motion may be transmitted from the column of air in the under-ground tubes to the index or pointer of the signal apparatus, either by means of a column of mercury, as in common mercurial barometers, or by means of a thin flexible metallic plate, or other suitable collapsible or yielding medium; which, by yielding when pressure is applied thereto, by means of the column of air in the under-ground tube, will raise or depress, or otherwise act on, the said plate or column of mercury or other yielding medium; and this motion of the plate or mercury, or other yielding medium, is communicated to the index arm by any convenient contrivance, as in the common wheel or aneroid barometers. Or, in place of the column of air being made to act against a thin flexible metallic plate, the pipe containing the air may be made to communicate with a bent or curved flattened tube, similar to those employed in Bourdon's patent barometers and steam or pressure gauges.

In Plate VIII., fig. 1, is a vertical section of one of the improved instruments. *a, a,* is a cylinder or syringe, in which the piston *b, b,* works. This cylinder communicates, by means of the trunk or pipe *c,* with a close chamber *d, d,* which is provided with a strong glass cover, and contains the indicating apparatus *e, e,* which is constructed precisely upon the principle of the common and well known aneroid barometer.

Now, as the piston *b,* is drawn up in the cylinder *a,* the air

becomes rarefied in the chamber *d*, and the vacuum chamber of the aneroid instrument is allowed to expand, and move round the index or needle *f*, to the right or left of the zero point; when, on the contrary, the piston is pushed down, the needle will be made to move in the opposite direction; and, by previously drawing in a small quantity of air through the lateral pipe *g*, the air will be compressed on the descent of the piston, and cause the needle or index, on its return, to pass beyond the zero point on the dial. From this it will be seen that the needle or index may be made to vibrate from left to right, and *vice versâ*, by any slight up-and-down movement of the piston *b*, *b*. The short branch pipe *h*, is for connecting a similar indicating apparatus, situated at any required distance, with the cylinder *a*, of the present apparatus, by means of a gutta-percha, metal, or other pipe, placed under ground, or protected in any convenient manner; so that by raising or depressing the piston *b*, the indices of both apparatus will be made to act simultaneously, and produce similar signals. A whistle or other audible signal *i*, is placed on the trunk, for the purpose of attracting the attention of the attendant, when it is desired to transmit a signal. For this purpose the whistle (when the instrument is not in use) should always be left open, so that the attendant at the opposite end may (by merely raising the piston to draw in the volume of air) be able to sound the whistle at the opposite end, by pushing down the piston and forcing the air out of the whistle at the other end. The attention of both attendants having been drawn by this means to the apparatus, the whistles may be closed by means of their stop-cocks, and the operations for making the visible signals commenced. It will, of course, be understood, that at the station at each end of the air-pipe or tube, there must be a complete apparatus, such as that shewn in the drawing, and consisting of indicating apparatus, air-cylinder, or syringe, and its appendages; so that audible or visible signals may be sent from either end.

Fig. 2, is an elevation (some of the parts being shewn in section) of a modification of the above; the difference in construction being confined to the indicating apparatus. Instead of the trunk *c*, and branch air-pipe communicating with a close chamber containing the indicating apparatus, as in the former instance, the trunk is connected directly to one end of the bent flattened tube *j*, *j*, which is closed at the opposite end, and is connected by means of a link *k*, to a short lever *l*, on the shaft *m*, of the index or needle *f*.

Upon drawing up the piston in the air-cylinder *a*, the bent

tube *j, j,* will be exhausted and collapse, and thereby push back the short lever *l,* and cause the index to move towards the right. Upon condensing the air in the bent tube *j,* by pushing down the piston in the cylinder *a,* the bent tube *j,* will uncoil or tend to straighten itself, and will thereby draw the short lever *l,* forward, and cause the index to move to the left; it will therefore be seen, that by alternately raising and lowering the pistons in the air cylinder or syringe, the index *f,* will be made to vibrate to and fro, and by these vibrations any signals or words may be communicated. On the dial is an alphabet whereby this may be effected. The patentee remarks, that although, in order to avoid complication, he has shewn a simple syringe and piston actuated by hand, yet he sometimes proposes, when the distance between the stations is long, to use a cylinder of much larger diameter and capacity, and to move the piston or piston-rod by means of a lever, or by rack work, in a somewhat similar manner to that now adapted to a compound or double-barrel air-pump.

The patentee claims the causing a needle or index-hand to move or vibrate on its centre by means of a column of air, alternately rarefied or compressed, or *vice versâ,* by a piston or other suitable contrivance; such column of air being made to act upon a thin flexible plate or diaphragm, or collapsible tube, or other equivalent means, connected with the shaft or spindle of the said index-hand or needle.

To THOMAS HILL, *of Southampton, Gent., for certain improvements in springs, and also in the modes of their application to railway engines and carriages,—being a communication.*—[Sealed 29th March, 1853.]

THIS invention consists of a spring or springs for railway and other carriages; and in certain modes of applying the same thereto. The springs are formed by laying together a number of plates of steel or other metal, the ends of which are clipped by means of buckles, rivets, or buttons; or the ends may be welded or soldered together. When the plates have been fastened at the ends by either of the modes above mentioned, they are beaten up into a serpentine form.

In Plate VIII., fig. 1, is a vertical section of the framing of a railway carriage, shewing the mode in which the springs are applied to the buffers. When applied in the manner shewn at *c, c,* both buffers act upon the same spring, or they may be applied as shewn at *g, g,* in the same figure;—in the latter

case the buffer-bars are shortened,—each buffer acts upon a separate spring, and the cross frames do not require to be cut through. The springs are held in their places by means of iron plates with double right-angled flanges, as shewn in section at fig. 2; which flanges form a top and bottom groove for the purpose of keeping the bows of the springs in their vertical position. In these grooves the springs have sufficient play to expand or contract as required. The iron plates are fixed so that the inner flange projects before the face of the frame, and keeps the spring clear, and prevents it from chafing. When pressure is applied to the buffers *d*, *d*, they act upon the springs through the bars *e*, *e*, which run or are moveable in sockets cut in the cross frames. The ends of these buffer-bars, and the ends of the springs, are always in contact; and, when the pressure is withdrawn from the buffer, the spring expands until it has recovered its original position between the two sockets or shoes *f*, *f*, provided for the purpose of keeping the spring from working beyond a certain point of expansion. Fig. 3, shews at *g*, *g*, a bearing spring of a modified construction applied to a carriage frame. The number of bows or loops of the spring may be more or less as may be required. *h*, is a loose ring to keep the inverted loop stiff. The bearing springs, as here shewn, are formed in two parts, rivetted together at the ends, and fastened to the axle-box at bottom, and to the carriage-frame at top

The patentee remarks, that he does not confine himself to the precise forms of spring shewn, nor yet the particular modes of applying the same, as both may be varied without departing from the principle of this invention; but he claims, Firstly,—the springs formed as herein described. Secondly,—all such modifications of the said springs, in form as may be, so long as the principle or mode of obtaining the spring is, by a similar construction, in accordance with this invention. And, Thirdly,—the application of the said springs to railway engines, and railway and other carriages.

To PETER WALKER *and* ANDREW BARCLAY WALKER, *of King-street, Warrington, in the county of Lancaster, for improvements in fermenting ale, porter, and other liquids.*—[Sealed 3rd December, 1852.]

THIS invention consists, first, of improvements in fermenting ale, porter, and other liquors, whereby the yeast or barm is effectually separated from the liquid during the fermentation;

and, secondly, in collecting or condensing the gas or vapour rising from the liquid during the process of fermentation, and reconveying the same into the ale, porter, or other liquid under operation.

In Plate VIII., fig. 1, represents an elevation, partly in section, of the improved apparatus for fermenting ale, porter, and other liquids; and fig. 2, is a sectional side elevation of the same. *a*, is the gyle-tun or vessel containing the liquid to be fermented, from the lid of which rises the pipe *b*, furnished near its upper end with a spout *c*, which opens into the yeast or barm chamber *d*. Near the centre of the bottom of the chamber *d*, is a valve *f*, by which the opening of the pipe *g*, can be closed, when required: this pipe forms a communication between the yeast chamber *d*, to the under side of which it is fixed, and the bottom of the gyle-tun *a*. The large pipe marked *h*, placed within the yeast chamber *d*, and supported by brackets from its lid, is for the purpose of condensing the gases rising from the liquid during the process of fermentation. It is preferred to make the pipe *h*, of tinned copper; and, in order to increase its condensing powers, a current of cold water is occasionally caused to run through it; the supply of water being admitted at the pipe *i*, and the overflow running off at *j*. The coil of pipe *k*, placed within the gyle-tun, is also supplied with an occasional current of cold water, in order to regulate the temperature of the liquid while undergoing the process of fermentation, in the same manner as has hitherto been customary in fermenting liquids in open chambers or vessels.

The mode of operation is as follows:—The malt liquor is conveyed by suitable pipes or troughs from the cooler into the barm chamber *d*, and runs into the gyle-tun *a*, through the pipe *g*. The supply from the cooler must be continued until the gyle-tun is completely filled, and until the malt liquor stands a few inches deep in the barm or yeast chamber *d*: the supply is then shut off, and the valve *f*, being open, the process of fermentation is allowed to proceed. The yeast or barm, rising from the liquid in the gyle-tun (the roof or lid of which is in a slanting direction, in order to facilitate its escape), ascends the pipe *b*, and overflows from the spout *c*, into the chamber *d*; and at the same time, the deficiency in the contents of the gyle-tun is replaced from the liquor in the barm chamber *d*, through the pipe *g*. The fermentation and consequent cleansing of the liquor proceeds thus without intermission, until the yeast ceases to flow from the spout *c*, or until the brewer considers the liquor sufficiently cleansed.

During the process of fermentation, the lids of the chamber *d*, must be kept closed, to prevent the escape of the gas which rises from the liquid to the upper part of the chamber *d*, and is there condensed, by coming in contact with the cool surface of the pipe *h*: it then trickles down again into the liquor, and thereby assists in making the same bright and clear, and in preserving it from acidity. The patentees remark that an air-pump may be used in place of the pipe *h*, for the purpose of collecting the gas rising from the liquid, and for forcing the same again into the ale, porter, or other liquor that is undergoing the process of fermentation. The brewer is enabled to keep the liquor in the gyle-tun at its proper temperature, by means of the refrigerator or coil of pipes *k*, which are kept constantly filled with cold water supplied through the pipe *l*, and let off at *m*, in the usual manner. The thermometer for ascertaining the temperature of the liquor is lowered into the gyle-tun by a string, through the pipe *b*; and if the temperature is found too great, the brewer, by turning the tap k^1, admits fresh water into the refrigerator, the current through which is kept up until the required temperature is obtained. When the fermentation is completed, the brewer closes the valve *f*, which is suspended to a cord passing over the pulley f^1; and the ale, porter, or other liqnid in the chamber *d*, is run off into a suitable receptacle through the tap *p*. When the liquid is removed, the tap *p*, is closed, and the yeast is cleared out through a bung-hole, provided in the bottom of the yeast chamber. The ale, porter, or other liquid in the gyle-tun is then racked off into barrels or casks through the tap *o*; and it is then fit for immediate consumption.

The patentees state that they do not claim the ascending and descending tubes by which the yeast is allowed to work itself clear of the liquor undergoing the process of fermentation. But they claim, first, the improvements in fermenting ale, porter, and other liquids, whereby large quantities of the same are allowed to work off the yeast, as hereinbefore shewn and described; and, secondly, the improved apparatus, as shewn and described, for condensing or collecting the gases rising from the liquid, and converting the said gases into liquid, to be again incorporated with the ale, porter, or other liquid under fermentation.

To Henry Carr, *of East Retford, in the county of Nottingham, civil engineer, for certain improvements in the construction of railways.*—[Sealed 21st April, 1853.]

These improvements in the construction of railways consist, firstly, in forming the inner part of the wing-rails of railway crossings solid, instead of with an overhanging flange, as in the ordinary crossing of I-formed rails.

In Plate VII., fig. 1, represents a general plan of an acute crossing; fig. 2, is a section on the line A, B, of fig. 1, shewing two wing-rails formed in this manner. *a,* is the common I-rail; and *b,* a filling piece between the upper and lower inner flanges. This filling piece prevents the splitting or shearing of the upper flange of the rail, where the edge of the wheel bears upon the overhanging part: it may be welded to the rail, or the rail may be rolled, or otherwise constructed of the sectional form of the ordinary I-rail and filling piece combined. The filling piece is continued to the part of the rail where the wheel first takes its bearing, or as far as is found to be necessary.

Secondly, in strengthening the middle and overhanging flanges of the point or point rails, by the introduction of the filling piece above described.

Thirdly, in constructing the two middle chairs of a railway crossing (commonly called the B and C chairs) in such manner that the whole of the rails, when placed in each chair, shall be wedged up by driving in two wooden keys, for the purpose of giving solidity to the point or rails in the chair, and avoiding that motion which causes them to work loose; and for preventing the rising of the rails in the chairs, there is a fillet cast on the distance piece, and also a fillet formed on the loose block, which fillets fit into grooves made in the wing and point rails. Fig. 3, is an elevation of a B-chair, with the point-rails, wing-rails, and keys, in section. *a,* represents the chair; *b, b,* the wing-rails; *c, c,* the point-rails, strengthened with the filling pieces *d, d*; *e,* is a loose block or distance piece, in place of the usual block cast on the chair; *f,* is a wooden key or wedge, for tightening the wing-rail *b*; and f^1, the key for securing the wing-rail *b,* loose block *e,* and point-rails *c, c,* firmly against the fixed block *g.* Fig. 4, is a view of a C-chair, with the wing-rails, point, and wedges, in section. a, a^1, are the wing-rails, with the filling pieces b, b^1; *c,* the point; *d,* the loose block or distance piece; and e, e^1, the tightening keys or wedges.

Fourthly, in supporting in a similar manner, with filling

pieces, the upper flanges of switches and stock-rails, of the ordinary form, where the wheels bear partially upon the rails.

The patentee claims, Firstly,—the construction of the wing-rails of railway crossings, with filling-in pieces. Secondly,—the construction of the point of the point-rails of railway crossings, with filling-in pieces. Thirdly,—the construction of point-rails with filling pieces. Fourthly,—the formation of wing-rails, points, and point-rails of railway crossings, by rolling them in one entire piece of the sectional form of the ordinary I-rail and filling piece combined. Fifthly,—the formation of wing-rails, points, and point-rails of railway crossings, by forging them in an entire piece of the sectional form of the ordinary I-rail and filling piece combined. Sixthly,—the formation of wing-rails, points, and point-rails of railway crossings, by casting them of malleable iron, of the form of the ordinary I-rail and filling piece combined. Seventhly,—the construction and arrangement of railway chairs with loose blocks and wedges, in the manner above described.

To HENRY BESSEMER, *of Baxter House, Old St. Pancras-road, for improvements in the process of refining and manufacturing sugar.*—[Sealed 15th July, 1853.]

THESE improvements consist, firstly, in separating the whole or greater part of the glucose matter or uncrystallizable colored syrups from sugar, prior to the manufacture of such sugar into loaves, lumps, or concrete masses, instead of separating such glucose matters after the loaf or lump of sugar has been formed, as heretofore practised in refining sugar; and hence the process of "liquoring or claying" the loaf may be wholly or in part dispensed with. In carrying into operation this part of the invention, the raw sugar may be dissolved in water, "blown up," and passed through animal charcoal in the usual way: the saccharine fluid is then to be concentrated to a density of about 45° Beaumé. To accomplish this process of concentration the fluid is brought into contact with currents of warm dry air, at a low temperature, in an improved apparatus, described in the specification of a patent, granted to the present patentee, 19th November, 1852; or the vacuum pan may be used in lieu thereof. By whatever means the process of evaporation is effected, the syrup, when sufficiently dense, is to be heated, in the usual manner, to a temperature of about 170 to 180° Fahr., and then put into large crystallizing vessels, which may be made of wood, and preferably of a cir-

cular form, capable of holding about one ton each; or it may be put into common sugar moulds. In either case the process of draining, claying, and liquoring, is not to be effected in these vessels or moulds; but as soon as the sugar has completely crystallized, the whole matters are to be removed from the vessels in a "green state," and are then sliced or broken up, so as to render the sugar suitable for the process of washing or cleansing in a machine, whereby the uncrystallized colored syrup may be separated from the crystals of sugar. The apparatus best suited to perform this washing or cleansing process is described in the specification of a patent granted to the present patentee, 19th November, 1852; or the washing or cleansing of the sugar may be effected by other machines, such as the centrifugal curing machine. The crystals of sugar, so treated and cleansed from their usual admixture of glucose or uncrystallizable colored syrup, are in a condition suitable for the formation of a loaf or concrete mass of sugar. The crystals obtained by any combination of the before-named processes, the patentee distinguishes by the term of product No. 1; and the fluid matter separated therefrom he calls product No. 2, and so on; using other numbers to distinguish the different products as a means of identifying the particular quality of sugar or syrup referred to. In order to form a loaf of sugar with the product No. 1, as much hot water or syrup, No. 3, (resulting from a previous operation) is used, as will, when sprinkled on the sugar, in part dissolve it, and form a semi-fluid matter, having a density of about 46° Beaumé. The product No. 1, mixed with water or syrup, is to be put into a vessel, the bottom of which is composed of a row of small copper pipes placed parallel with each other, and nearly close together; and through the interior of these pipes hot water or steam is made to circulate, in order that the wet crystals resting upon them may acquire such a degree of heat as will cause a portion of them to dissolve, and, in this partially dissolved state, flow through the spaces between the pipes, and be received in a vessel or heater, provided with a jacket for containing hot water or steam, for the purpose of preventing loss of heat from the dissolved sugar during its accumulation in the heater. When the charge of sugar has all flowed into the heater, if its temperature be less than 180° Fahr., it is quickly to be brought up to that heat, and then, without loss of time, put into moulds of the size and form desired. The mould should be placed in "pots," and, when the process of crystallization is completed, the plugs are to be withdrawn from the bottom of the moulds, and the white

mother liquor allowed to run out; which fluid has been hereinbefore referred to as product No. 3: the loaves may then be "cleaned off" and dried in a stove. Should, however, the color of the loaves not be quite so good as the manufacturer desires, "water clay or liquor" may be used in such quantity as may be found necessary to produce the required color. The "drips" resulting from such claying or liquoring process may be mixed with No. 3 product, and be worked up in the manner before described in reference to that product; or the drips may be returned to the evaporating-pan. In the washing or cleansing process which follows the first crystallization, the saccharine fluid, No. 2, is obtained, which consists of colored glucose matter combined with dissolved crystallizable sugar and water. This fluid should be concentrated to a density of about 45° Beaumé, and then be put into large vessels or moulds to crystallize; after which the mass may be subjected to the action of the washiug or cleansing machine; when a crystallized sugar will be obtained, called product No. 4, and a syrup, No. 5. The crystals, No. 4, may either be mixed with water or syrup, No. 3, in such proportions as to yield a semi-fluid, having a density equal to about 46° Beaumé: this mixture, on crystallizing, will also yield loaf sugar of a good quality. Or, in lieu of this mode of treating it, the product, No. 4, may be mixed with the crystals, No. 1, in the proportion in which they are produced, and which mixture is to be treated in every respect as before directed, in reference to product No. 1. Whenever the syrups, No. 3, or the drips, acquire too deep a color, they may be put into the evaporating-pan, and thus form part of a new charge; so that, ultimately, the whole (or nearly so) of the crystallizable matter may be converted into loaf sugar. The syrup, No. 5, which is of a low or inferior quality, should be concentrated to about 46 or 47° Beaumé; after which it is to be crystallized, and is then to be subjected to powerful pressure in the manner described. There results from this pressing operation, a product, No. 7, which consists of small crystals of bastard sugar in a nearly pure state, and may, therefore, be sent to market; but it is preferred to dissolve it in a fresh solution of raw sugar that has passed through the animal charcoal filter; or it may be returned to the evaporating-pan, where it will add to the density of the syrup, and form part of a future first product. The last or eighth product is treacle, which is obtained by pressure, as before mentioned, in a fit state for sale; being the only product, except loaf sugar, obtained by fully carrying out this process of refining. In the refining of sugar, as at present

generally practised, several different qualities are produced, each having a different commercial value. One of the objects of this invention is more nearly to equalize the value of such products by increasing the value of the more inferior kinds; this is effected in the following manner:—the inferior sugar, such as "pieces and bastards," after crystallization has taken place, are to be washed or pressed by any suitable machines; but instead of sending such washed, cured, or pressed sugars to market, they are dissolved in the raw sugar liquor, after it has passed through the animal charcoal filter; or in lieu of this, the sugar may be put into the vacuum-pan or other concentrating apparatus, whereby the inferior crystals are blended with the new portions of sugar, and form part of the loaf, which would otherwise have been made from the raw sugar alone. It will be readily understood that the process of evaporation is not increased by the addition of this sugar to the liquor, whether it be added thereto in the pan, or be dissolved in the filtered liquor, before supplying the pan with it; so that all the inferior crystallized products may be returned to the evaporator, and be converted into sugar of first quality. In some cases, sugars that have been cleansed by machinery may be added to or mixed with the concentrated syrups while in the crystallizing vessels, where they will form a nucleus on which a further crystallization will take place, and will thus form a portion of the superior quality of sugar without causing much additional labour or expense.

The patentee claims the combined processes herein described of refining sugar.

To HENRY BESSEMER, *of Baxter House, Old St. Pancras-road, engineer, for improvements in the manufacture and treatment of bastard sugar, and other low saccharine products, such as are obtained from molasses and scums.*—[Sealed 15th July, 1853.]

IN the process of refining sugar, as at present practised, those syrups which yield bastard or other low qualities of sugar contain so large a proportion of dark colored glucose matter as to cause the formation of small and ill-defined crystals, while the mother liquor or treacle, from its viscid condition, does not flow freely from them by the mere action of gravity; and hence not only is much time wasted in the process, but a very inferior sugar is obtained. In the production of sugars from refiners' scums, and from West India or other molasses, a similar incovenience is felt, owing to the presence of a large

quantity of viscid uncrystallizable matter. The entire separation of these glucose matters from the crystals of sugar, by means of the centrifugal or other curing machines, cannot be effected without either dissolving a portion of the crystals, by the use of water, or mixing with the treacle the "liquor" used in the washing process: in either case a loss is sustained; for, in the separation of the last products of the refining process, no crystallizable matter should be mixed with the treacle.

Now, the object of the present invention is to lessen or remove the defects pointed out above in the ordinary process of refining sugar, for which purpose the following plan is adopted:—Firstly, the syrup intended to be operated upon may be concentrated, by any suitable means, to the same degree of density as is now generally employed in the production of bastard sugar; but a larger product of crystallized sugar will be obtained if the concentration of the syrup is carried to three or four degrees Beaumé beyond the usual density; after which it may be let down into large crystallizing vessels, which should hold about one ton each; because vessels of this size retain the heat of the matters sufficiently long to cause the formation of larger crystal than is produced from such syrups when allowed to cool rapidly. As soon as the syrup is cooled down to about 120° or 110° Fahr., the mass, without any previous drainage, and while still in a warm state, is to be put into bags, made of a textile fabric similar to that used in the process of expressing oil from seeds. These bags are piled up in a hydrostatic or other press, capable of exerting a great degree of pressure upon them. Between each bag is placed a galvanized iron plate, both sides of which are covered with a piece of coarse wire-gauze, which is soldered to the iron plate at each edge, in consequence of the pervious nature of the wire-gauze. A communication from every part of the surface of the plate is established with the exterior edges of it, which project beyond the bags; and thus the fluid matters that exude from the central part of the bags find a passage between the wire-gauze and the iron plate to the exterior edges, where they escape; and, falling from plate to plate in the press, are finally received in a gutter which runs round the base of the press, and from which a pipe may be made to convey the fluid to any convenient receptacle. In those cases where a large quantity of fluid matter is present, it will be found preferable to subject the bags to a preliminary operation in presses of small power, acting with a screw or weight, so as to force out a portion of the fluid, and render the bags thinner and more flat before subjecting them to the more powerful

press; by means of which so large a proportion of the glucose matters will be expelled as to leave a cake of sugar of good quality in the bags. The sugar to be operated upon may, as before stated, be put into the bags, at a temperature of 110° to 120° Fahr.; at which heat the treacle is so fluid as to leave the sugar more completely than would be the case if the syrups were lowered down to about 60°. But it is well known that the quantity of sugar held in solution, in all saccharine fluids, depends on the temperature, and is greater as the temperature is higher; hence it follows, that, to get the greatest quantity of crystallized matter deposited, the temperature should be lowered as much as possible in the ordinary mode of manufacturing bastard sugar. The lowering of the temperature to 60° Fahr., or thereabouts, must not be allowed, because the syrups would become too viscous to drain off by the mere action of gravity; and, for the same reason, the concentration of the syrup cannot be carried so high as to insure the formation of all the crystallizable matter into crystals; but, with the great amount of pressure that can be brought to bear upon the bags of sugar, by the means hereinbefore described, this difficulty is removed. It is therefore preferred, in the first instance, to concentrate the fluid to about three or four degrees Beaumé above the density commonly employed, and to allow the matters to cool down as low as the temperature of the season will readily admit of; whereby a larger quantity of sugar may be crystallized and separated from the treacle, by this process of pressing, than is usually obtained from syrups of a like quality. The patentee remarks, that in such cases, as the syrups are brought up to a greater density than usual, and are intended to be cooled as much as possible, it will be preferable to pour such concentrated matters into shallow trays, so as to form a cake of a suitable size for the bag in which it is to be pressed. The saccharine matters, thus concentrated and cooled down, are to be subjected both to cold and hot pressure, which is effected in the following manner:—

The press-plates are composed of two parts, in one of which a number of channels are formed, which are distributed as evenly as possible over the surface of the plate, and which communicates, at one end of the plate, with an inlet-pipe, and at the other end with an outlet-pipe: the other part of the plate is made without grooves, and is firmly rivetted to the first-named one, in such a manner as to cover over the channels, and convert them into a series of internal passages, which traverse the compound plate, and form a passage for steam or water to circulate in. The whole of the rivet-heads are to be

counter-sunk, and the plate galvanized, which will prevent its rusting, and render the joints and rivets secure from leakage. Each side is then to be covered with wire-gauze, as before described. These press-plates are supported in the press upon bars or pins, and at each end they are connected by a jointed or flexible pipe to an inlet and outlet-pipe. The mode of operating with them is as follows:—The matters are first put into the bags, which are then placed between the plates (which are cold), and the press is gradually brought up during a period of about two hours; at the end of which time it should be about equal to half a ton on each superficial inch of the bag. Hot water or steam of low pressure may then be made to pass through the passages formed in the plates. The heat thus communicated to the sugar will render the small remaining portion of treacle sufficiently fluid to run out. After continuing the pressure for half or a whole hour, the press may be let down, and the bags removed; meanwhile, cold water is to be passed through the plates, to render them sufficiently cool to operate on a fresh set of bags. It will be observed in this mode of treating the matters first in the cold state, that nearly all the fluid portions are removed previous to the application of heat; and, consequently, when heat is applied to finish the process, only a very small quantity of crystallized sugar will be dissolved, owing to the small quantity of fluid matter still retained among the crystals. If it be desired to take the pressed sugar into the market without crystallizing it, its color and purity may be further improved by moistening it with water or liquor, and then giving it a second pressure, which will add much to the whiteness of the product. When the cakes are removed from the bags they should be passed through a roller-mill, so constructed that one of the rollers moves at a greater speed than the other; whereby the whole mass will be reduced to a state of powder, and will be fit for market. The treacle running from the press will require no further process to render it fit for sale. But all low sugars that exhibit little or no grain, from having had the glucose matters separated from them by pressure, in the manner herein described, may be dissolved and re-crystallized alone. Or they may be mixed with a solution of raw sugar after it leaves the charcoal filter, or with other saccharine fluids which have not been much injured by the application of heat in the various operations to which they may have been subjected. The latter mode of manufacturing and treating sugar that has been previously separated from its mother liquor, by mechanical means, is

fully described in the specification of a patent granted to the present patentee, and bearing even date herewith.

In the manufacture of sugar from West India or other molasses, two modes may be employed in preparing it for the pressing process. By one mode, the molassess imply require filtering through bags, or they may be "blown up" before filtering; but no water is to be added. After the filtration has taken place, the molasses are to be highly concentrated, put into crystallizing vessels or shallow trays, as before described, and, after crystallization has taken place, the fluid and solid saccharine matters are to be separated by pressure, as before described in the treatment of bastard sugar: the crystallized matter may also be treated in like manner. The other mode of treating molasses differs only in first reducing their density to about 27° or 30° Baumé, and passing the liquor through animal charcoal; after which it is to be concentrated, and then pressed and treated by either of the methods before described in reference to the manufacture of bastard sugar. So likewise in the manufacture of sugar from scum-liquor or other low saccharine products, obtained by washing or cleansing raw sugars, a similar treatment is to be observed.

The patentee claims, First,—the mode, herein described, of treating bastard sugar and low saccharine products, obtained in processes of refining sugar herein mentioned. Secondly,—the combined agency of heat and pressure for the purpose of separating the solid from the fluid parts of bastard sugar, and other low products, obtained in the manufacture and refining of sugar. Thirdly,—increasing the density of sugar solutions in the process of evaporation beyond the point which will admit of the drainage of the syrup from them by the action of gravity; and also cooling the same below the temperature which would admit of a like drainage by the same means, when such cooled and concentrated matters are to be subjected to pressure and heat, for the purpose of separating the glucose matter therefrom. Fourthly,—the use of shallow trays for crystallizing cakes of sugar that are afterwards to be pressed, for the purpose of separating the glucose matters therefrom. And, Fifthly,—dissolving pressed cakes of bastard sugar in a filtered solution of raw sugar, in order that such bastard sugar may form part of the refined product.

To John Wallace Duncan, *of Grove-end-road, St. John's-Wood, Gent., for improvements in adhesive soles and heels for boots and shoes, and in apparatus used for preparing and applying the same.*—[Sealed 16th July, 1853.]

This invention consists in the adaptation of suitable water-proof cement, applied preliminarily for an adhesive surface upon soles and heels, which, at natural temperatures, are free from stickiness, and rendered suitable as articles of commerce.

In this condition the material (when of proper size) only requires to be heated to the necessary degree for becoming sticky, and applying to the bottom of boots and shoes, &c., without the use of any solution or other cement; when they will adhere and become fast, after cooling down to a natural temperature.

The cement employed for this purpose is described in the specification of a patent, granted to the present patentee the 14th October, 1853.

Other cements may be, however, used, without deviating from the character of this invention.

The cement may be coated upon the material or substance of the soles or heels by apparatus described in the above mentioned specification; although any other suitable method may be adopted, and the cementing matter applied either as an entire or partial coating alone or combined with thread, wire, woven fabrics, fibrous materials, or other matters found advantageous, upon the proper surface, or in spots, holes, grooves, or chequers.

The material for the improved soles and heels may be leather of any suitable description, gutta-percha, caoutchouc, cattimundo, gum-muddar, or other compounds (in any condition of treatment), either alone or combined with fibrous materials, textile or woven fabrics, cork, wood, horn, metals, glass, or earthenware.

Another of the improvements in soles consists in making galoe soles of a length and width sufficient to encase the lower part of the boot or shoe to which they are intended to be attached. A vamp or welt piece is formed all round the entire sole, rising from the edge; it is made contracted all round the top so as to incline towards the middle, and high enough to embrace the lower part of the upper leather of the boot or shoe. These goloe soles may be formed of any suitable material, such as sole leather, cork, wood, metal, caoutchouc in any state of vulcanization, or combined with woven or

fibrous material: the rising edge is made of a more flexible substance than the bottom, in order to grip and be easy to the foot. These soles are preferred to be manufactured of a combination of woven material with gutta-percha or its compounds, after being treated according to the process patented by the present patentee, 4th September, 1851, which consists in "subjecting gutta-percha in a state of mastication to the action of hot air,—regulating the temperature gradually from 200° to about 350° Fahr., and continuing it for several hours according to the quality of the gutta-percha, in order to dispel the natural moisture from it. This, if properly effected, renders articles made of that material less liable to change from atmospheric influences."

For facility and superiority of manufacture these soles may be constructed in moulds, adapted to any machinery for "automically elaborating, moulding, and consolidating progressively gutta-percha and its compounds," also described in the specification of the patent of 1851. In moulding soles, &c., hot water of a high temperature is used, circulating in the jacket round the mould column of the said apparatus; while the hot moulds containing the gutta-percha compound are slowly progressing towards the top. The requisite parts of the moulds may be engraved or chased to ornament the articles as desired; and soles or heels may be made of an elastic or hard compound according to the proportions of the vulcanizing matters combined, and degree and duration of heat to which they are subjected while in the moulds.

Gutta-percha sheet, manufactured as pointed out in the specification of the patent of April, 1853, may be used for making the improved soles, according to which, the material consists of rolled bands of gutta-percha and its compounds. Gum-muddar or its combination is also applicable, and may be perforated, embossed, and cut out at one operation from that form of material.

Soles are made of leather, hardened sulphurized caoutchouc, or gutta-percha, or other material perforated and combined with elastic vulcanized gutta-percha or caoutchouc, disposed so as to protrude through perforations and appear in relief, so that the weight of the wearer may be sustained upon the elastic portion of the compound soles next the ground. Thick cork soles and heels, hooped or not round the edge, are prepared with leather or gutta-percha coated with an adhesive surface, to attach boots, shoes, or goloshes, for wear, during wet weather. Any of these descriptions of soles and heels may be ornamented by printing or stencilling various designs

with adhesive cement upon the wearing face, and applying thereon either coloured flocks, powdered colours, metal powders, or leaf.

The patentee does not restrict himself to the use of sole leather manufactured by any particular method, but for facility in procedure, prepares and conditions the leather by machinery, as hereinafter described; previous to passing it under the coating apparatus to receive the charge of cement. When the cement cools, the leather may be perforated and embossed as desired, if not so treated previous to coating; and then cut out into suitable shapes for soles and heels, by machinery actuated by steam power or otherwise.

In order to condition and prepare the leather, it is passed through one or more pairs of rollers or cylinders, geared and mounted in suitable framing: the upper one of the pair is constructed with the surface studded with convex projections; the other having a plain surface. The action of these rollers is to expand the leather to its utmost limit, and render it dense and firm when passed between them in a damp state (the effect is similar to that produced by the shoemaker hammering the leather upon the lapstone); it is then dried and subsequently treated according to the other part of this invention. In order to surface leather and prepare it to receive the cement, a machine is employed, consisting of a cylinder constructed of a series of discs similar to circular saws; but between each toothed one a plain disc of about the same diameter is placed, and all fixed upon an axle, and all screwed close together. Parallel to this roller a plain roller is opposed, but which is made to revolve at a slower speed. A pair of feed-rollers, driven at the slower speed, is placed in the same frame for feeding the sole leather; the flesh side being exposed to the action of the disc roller, which rasps all the loose fibrous matter from the leather, and leaves a surface suitable for coating with the cement.

Leather and like material may be embossed for soles by passing such between rollers engraved or chased with a design. Ornamental dies, to be used either hot or cold, for embossing, chequering, corrugating, indenting, or printing the soles as desired, are arranged to suit and adjust upon the ram-bed in a machine, the ram of which is actuated by a revolving excentric, which embosses with rapidity. Reciprocating cutters, and perforaters for cutting out the soles or heels, and for perforating them, are actuated by a revolving excentric.

In preparing the soles or heels for the insertion of the studs, the patentee employs a series of taper half-round cut-

ters, fitted vertically, to revolve, so as to cut out the required number of holes in their proper position through one or more thicknesses of leather at one operation; and into these holes he inserts the studs. These studs, which are intended to render the soles more enduring, may be made by forming a thread or screw on a wire, which is afterwards cut off in suitable lengths for the purpose; or such studs may be cast of suitable metal. In moulding these screw-studs it is found advantageous to proceed as follows:—The patterns from which the studs are cut are to be cast in two halves longitudinally, and the halves cemented on opposite sides of a plate of glass in position coinciding with each other. The half screw on one side of the glass is then impressed into the sand, on which the surface of glass presses—producing the division of the mould. The opposite half of pattern on the other side of the glass is similarly impressed in the sand to form the opposite half of the mould. The patterns and plate of glass being removed, the half moulds are brought together for the purpose of casting in the ordinary manner. The moulding of such studs would of course be effected by placing a number of such patterns on one sheet of glass, and casting them in series. By using glass as the medium on which to affix the patterns, the several half patterns may readily be brought opposite each other, and, at the same time, its transparency enables the moulder to see whether his moulds are perfect: clean castings will thus be obtained with facility.

These studs may also be made of stone, earthenware, or glass, coloured or otherwise, for the purposes of ornamentation. Ivory, bone, horn, nuts, wood, shells, hide, leather, hardened caoutchouc, or gutta-percha, are also suitable for studs, when moulded, shaped, or arranged for ornamental or wearing purposes.

In order to mould, emboss, or perforate soles of gutta-percha, gum-muddar, or similar material, in a plastic state, with rapidity, two endless belts of articulated metal plates are employed, which are each carried by a pair of drums or rollers so placed and driven side by side that the faces of the belts come together in juxta-position, antagonistic to each other, and travelling in the same direction.

The belts are each furnished with suitable moulds, which meet and register properly with each other.

The belts and moulds, where so meeting and travelling together, pass through a tube or passage, bell-mouthed where they enter, but which is gradually contracted so as to bring the moulds in close and forcible contact. Plastic material

being fed between the belts and moulds, it is conveyed away in sufficient quantity, and carried through the contracting and compressing chamber, where it is moulded and consolidated into the form of the moulds. The moulds, on emerging from the compressing chamber, separate and deliver the moulded articles, suitably ornamented and embossed, if required. The latter portion of the compressing chamber should be parallel, and surrounded with cold water, so as to harden the moulded articles before delivery, and while still under pressure. The compressing chamber or passage may permit any superfluous material expressed from the mould to escape, it being simply necessary that the belts and moulds should be brought and kept in close proximity for the above purpose.

For rasping or cleaning the shoe soles, preparatory to applying the adhesive soles, a brush or scraper is formed, made by inserting sharp-pointed steel pins into a metal head or wooden handle, similar to a brush.

For holding gutta-percha or other soles, while being heated for applying to the shoes, &c., it is found convenient to use a chamber or flat vessel with a raised flange or edge, forming a recess in the side of the chamber in which the sole rests. This chamber is filled with cold water, to keep that part of the sole cool which is not exposed to the fire or heat.

For heating the adhesive surface of soles, a small chamber of burning charcoal, presenting an open fire, is used, or a series of burning jets of gas, or a camphine or naphtha lamp, may be used for the purpose.

The same means may also be used to dry the bottoms of boots or shoes preparatory to applying the adhesive soles. Small sharp screws, such as gun ramrod screws, fixed in a handle, are useful to hold the sole on to the bottom of the boot or shoe, and prevent it shifting after being heated, and applied until the cement cools and sets.

Leather soles, prepared according to this invention, are said to possess all the advantages of gutta-percha soles, with greater durability in wear, facility of application, and without any disagreeable smell of naphtha or danger from fire, and at a much smaller cost.

The patentee claims, Firstly,—manufacturing soles and heels, with a preparatory adhesive surface, as before described. Secondly,—he claims goloe soles, fashioned so that the lower part of the boot or shoe may be fitted and encased, as described. Thirdly,—perforating soles and heels formed of leather, gutta-percha, or other materials that are of a close substance, in order to allow the air, or superfluous cementing

matter, to escape through the perforations when attaching them to boots or shoes. Fourthly,—the insertion of studs through one or more thicknesses of material forming the sole or heel prior to application, as before described. Fifthly,—the manufacture of soles with flexible vulcanized gutta-percha or caoutchouc protruding in relief. Sixthly,—an apparatus for holding and keeping cool gutta-percha or adhesive soles while being heated. Seventhly,—the instrument described for cleaning the bottoms of the boots or shoes preparatory to the application of adhesive soles.

Scientific Notices.

INSTITUTION OF CIVIL ENGINEERS.

February 28th, 1854.

The paper read was "*On the means of attaining to uniformity in European measures, weights, and coins,*" by Mr. JAMES YATES, M.A., F.R.S., &c.

Believing that the only way of attaining the object in view, was by the adoption of the French system of measures, weights, and coins, and that such a step would be attended by great advantages in regard to exactness and convenience, as well as uniformity, the author first gave a brief account of the origin and principles of that system. The method of determination of the "mètre," as the standard of linear measure, and the representation of it by the bar of platinum deposited in the National Archives at Paris, was narrated. A description was then given of the mode of deducing from that standard all other measures of length, of superficies, of solidity, and of capacity; as also of the determination of the fundamental weight, called the "gramme," and the derivation therefrom of the "franc," containing five grammes of standard silver and forming the basis of the ascending and descending series of coins and monies. The advantages of the decimal divisions and multiples, and of the names applied systematically to all, were asserted, notwithstanding the partial recommendations of the octonal, and, still more, of the duodenal methods of computation.

Adverting to the successive obstructions and difficulties which the system had to encounter from political disturbances, as well as from popular prejudice, and the previous habits of the French nation, the author mentioned its final establishment, during the reign of Louis Philippe, and its gradual extension and steady progress subsequently to that period, both in France and in many other of the continental kingdoms. As practical examples,

specimens were exhibited, shewing some of the forms, in which the French measures were now sold, and applied to all the purposes of common life.

Considering the success which had attended this grand project of social improvement; the generous and enlightened spirit in which it was conceived; the difficulties which it had surmounted; the successive amendments which it had received, as the result of experience, during the course of more than half a century; the exactness of its principles, and beauty of its adjustments; and the almost universal approval accorded to it by the millions of persons who now employed it in their daily intercourse and occupations, it was considered manifestly impossible that it should ever be abandoned for any other system, wherever it had once been adopted. If this were true, it followed, that the French system must remain, whatever other systems might be discarded, and it might consequently become universal. It was therefore argued, that it would be wise to take advantage of the progress towards uniformity thus made, and to use all means for extending the influence of that system.

As the French had not hesitated to adopt British inventions, when the advantages were made apparent, it was argued, this country should be equally willing to adopt any amelioration, from whatever source it might be derived. No nation was better qualified than the French to introduce improvements in the theory and practice of metrology. If they had not already offered an admirable system to the world, all civilized nations would look to them as, perhaps, the most able to invent such a system, on account of their acknowledged attainments both in theoretical and mathematical science, and their dexterity in certain branches of mechanics. No narrow prejudice or national antipathy should prevent an international combination for the promotion of a scheme fraught with advantage to the interests of commerce, of science, and of philanthropy.

In addition to the objections urged by theorists, there were others, equally formidable, arising from habit and popular prejudice. These, it was contended, must be overcome by the combined efforts of the government and the people. The government had under its control infinitely the greatest amount of measuring and weighing, and counting of money, in the kingdom, and, consequently, had the greatest interest in introducing a system which would be attended, in addition to numerous and far greater benefits, with a saving of a very large amount, probably a quarter of a million annually, in the collection and management of the revenue. But the government could not possibly effect this great change, apart from the people; therefore the people should cooperate with, even if they did not commence the work; and it was a question whether it was not best that the change should begin at the bottom of the scale. The French system was so simple and beautiful that it could be taught, in a week, to the

children of all schools for the poor throughout the kingdom; and they would take a pleasure in diffusing the knowledge of it among their parents and elders. Decimal methods of computation, and the ability to use the French measures, weights, and coins, having been propagated among the poor, would necessarily be well known to the rich, and would thus soon become familiar and habitual among all classes of the people.

The objection made to the use of French terms, such as *franc*, *centime*, *mètre*, &c., was refuted, on various grounds. These terms were not, in fact, French, but rather Greek and Latin, and they were on that account, at first, to some extent, repudiated by the French. On the other hand, avoirdupois and troy (*troyes*) weight being French, the English were now only asked to exchange old and inconvenient French weights for new ones, which were better. But the introduction of numerous terms with other fashions and usages from France, and their constant recurrence, shewed that this objection was much over-rated. Even if it were a valid objection in point of fact, it was one of little moment: for, if the terminology was objected to, the system might be taken without it. The Piedmontese, for example, used the French monetary system, although they called a franc a "*lira*." As the Arabic numerals, which were used wherever computation by tens was practised, were the signs of numbers, which were called by different names, in different countries, and yet were everywhere received in the same sense, so the same measures, weights, and coins, might be known, in the various parts of the world, under different denominations, and yet be perfectly understood and employed, by common agreement, throughout the earth.

The author exhibited a scheme of coinage, having the franc for its unit—the scale ascending to one hundred francs in the one direction, and descending to the one-hundredth part of a franc, called a "centime," or "cent" (*pars centesima*), in the other direction. He maintained that the franc, occupying a middle place between the highest and the lowest coins, and being of that value which was either on a par with the great majority of purchases and payments in this country, or certainly not at all below them, was well fitted to be taken as the middle term, and, in this respect, was preferable to the pound sterling, or even to the dollar. At the same time, nothing could be better adapted to secure facility, promptitude, and correctness, in keeping accounts, than the reckoning by francs and centimes. He thought it useful to have a gold coin of one hundred francs, and a centime (perhaps of brass, on account of its large dimensions), in order to exhibit both extremities of the series to the eye, and to make that series complete. He considered the rare occurrence of these smaller coins to be no objection, but the contrary; because it would shew, that the middle term was fixed where it ought to to be,—at that point where coins were in most constant requisition, for the purposes of trade and daily intercourse.

Remarks were offered, shewing the application of the subject to the employments of shopkeepers and retail traders, merchants and bankers, stock and sharebrokers, and more especially to railway companies; as also its almost indispensable necessity with a view to international postage.

In conclusion, it was suggested, that all persons who were interested in this question, either on commercial grounds, from the love of science, or as the friends of peace and human progress, should use every means of co-operating with the government, and either by forming associations, or otherwise, endeavour, in every possible manner to induce the mass of the people to become acquainted with the principles and advantages of the French system; and thus, with all convenient speed, to introduce the knowledge and use of it, not only in Great Britain and Ireland, but in all the colonies and dependencies of the kingdom; and, through the influence of example, eventually to extend it to the United States of America, and other independent countries.

March 7th, 1854.

The evening was devoted to the discussion of Mr. Yates' paper "*On the advantages of uniformity in European weights, measures, and coins.*"

After describing the steps taken to induce the attention of the Legislature to the subject, and reviewing succinctly the evidence of the different witnesses examined before the Select Committee on Decimal Coinage, and the report resulting from that inquiry, the advantages to be anticipated in all matters of money accounts were first dilated on, and then the translation of the present diversified weights and measures into one uniform, and decimally-divided system, was insisted on.

It was urged, that great facilities would be introduced in keeping accounts and making calculations; that the pound sterling being adopted as the integer, the whole of the coins in present use might be retained, by only stamping their decimal value upon them, and thus keeping them in circulation until a new decimal coinage could be prepared. The proposed coins were shewn to be sufficiently small for the purposes of the poor, for whom the quantities of merchandise would always be adapted to the purchaser's means; and the pound sterling, remaining as the integer, was urged to be all that the large bankers and merchants could desire.

It was argued, that there were great objections against endeavouring to assimilate the coins of this country with those of other states; inasmuch as it would be impracticable to get all countries to agree: despotic monarchs would still continue, as heretofore, to debase the value of the coinage to meet the exigencies of the moment; and even republican states had depreciated the value of their money: so that, if all coins were to-day uni-

versally of the same standard and value, there was nothing to prevent their being all wrong to-morrow. Therefore, all that could be done was to decimalize the currency of this country, without reference to that of other countries; and it was then thought that, eventually, the same adjustment of weights and measures would follow,

The work of General Sir C. W. Paisley was quoted, to shew the inappropriateness of the mètre and its sub-divisions for this country. It was urged, that even in France its use had only been enforced, during the revolution, by the harshest means; and that even then the *système usuel* (feet and inches) had remained in force for nearly half a century, and, in spite of decrees, was even now scarcely abolished. The further propositions made by the General, for a decimal system, based on the existing coins, weights, and measures, were carefully examined.

Professor Airy's evidence before the Committee was dilated on; and it was endeavoured to be shewn, that any attempt to assimilate English and foreign coinage must fail, if only from the force of public opinion, and the passive resistance of those who had no interest in making any change.

It was a question of immense difficulty, how to establish a natural basis for a standard: it had been, in almost all cases, found impossible to establish one correctly, and therefore an arbitrary standard had been preferred. The precautions taken for preserving correct types of the standards for England were detailed. The introduction of the decimal sub-division of the pound troy, for the use of the Bank of England and the bullion dealers, was quoted as an example of what necessity would do naturally, and was used as an argument to urge civil engineers, architects, and builders, to introduce some uniform scale of decimal measures, to which money values would be brought to assimilate more easily on the decimal than on any other system.

It was shewn, that the Government could only "enforce" a decimal division of the coins of the realm; but it might "permit," eventually, such an arrangement of measures and weights as would be found most convenient, by merchants and traders, for the purposes of commerce.

The system of the franc, and the penny, was strenuously urged, as being the simplest and best adapted for the wants and habits of the laboring classes.

It was contended, by others, that the proposition of the Committee on Decimal Coinage, for adopting the pound sterling as the integer, and dividing it into 1000 mils, was untenable; inasmuch as besides unsettling tolls and postage stamps, authorised by Act of Parliament, it would alter the prices of produce of all kinds, and only, in a few cases, supply equivalent rates; nor would it meet exchanges with France and other countries, without dividing the cent. into most inconvenient fractions.

It was therefore urged, that it would be more convenient to adopt a lower integer, proposing either a coin of the value of 25

pence=100 farthings or cents.; or a coin of the value of 10 pence=40 farthings or cents. The latter was considered to be more in harmony with the monies of France, Holland, America, and other countries, where the decimal system had been already adopted. The coin of $\frac{4}{10}$ths of a farthing would equal the centime of France. The exchange with other countries would be met, within $\frac{1}{8}$th of a cent., and manufacturers would have a denomination to suit the smallest variation in prices, or profits, without using the extreme fractions now resorted to.

If it were admitted that the true arithmetical and scientific division of the integer was into 100 parts or cents., no difficulty, it was contended, would be experienced in the practical introduction of the system into commerce, and into retail trade; its adoption would lead to a more correct method of estimating profits and losses, and of keeping books; and it would facilitate calculation, and the receipt and payment of duties, taxes, and monies of all kinds.

As early as the year 1832, Mr. Babbage had in his "Economy of Manufactures," drawn attention to the decimal system, as being the best adapted for facilitating all mercantile calculations, and had suggested the conversion of the present currency into a decimal series.

It was stated, that at the period of the Great Exhibition, in 1851, Monsieur de Vinsac, member of the Academy of Macon (France), was deputed, by that society, to endeavour to induce the adoption, in this country, of a system of weights, measures, and coins, somewhat analogous to, if not identical with, those of France. That period, however, was not favourable for the consideration of the subject, and Monsieur de Vinsac had left, with the Secretary of the Institution of Civil Engineers, certain documents, from which should now be culled and translated all that might apply to the question, in order to their publication with Mr. Yates' paper.

The discussion was adjourned until Tuesday, March 14th.

March 14th, 1854.

The discussion on Mr. YATES' paper, "*On the advantages of uniformity in European weights, measures, and coins,*" was continued throughout the evening, and not being concluded, was adjourned until the meeting of Tuesday, March 28th. The summary of the discussion on both evenings will therefore appear as one report.

March 21st, 1854.

The first paper read was a "*Description of Martin's improved Jacquard machine,*" by Mr. EDWARD LAFOREST.

After stating the very general application of Jacquard machines to all ornamental weaving, the paper described the old machine,

and the manner in which the patterns were produced, by means of bands of punched cards acting on needles with loops or eyes, which regulated the figure. It shewed, also, the great wear and tear to which these cards were subjected; indeed, so much, that for the carpet trade they were often required to be made of sheet iron.

In Martin's new Jacquard machine the object had been to substitute for the heavy cards a sheet of prepared paper, punched with given apertures, like the cards of the old machines; but, ininstead of being a series of pieces 2½ inches wide, laced together, the punched paper formed a continuous band, only ¾ of an inch wide, with so diminished a bulk, that the weight of the new band, as compared with that of the old cards, was in the proportion of 1 to 11.

The method by which this desirable result had been attained was then explained to be chiefly by an arrangement which permitted the four hundred spiral springs on the needles used in the old machine to be dispensed with; when, as a consequence, the force and wear and tear, due to their resistance, would be done away with; and fine and light wires could be made to do the work of strong and heavy ones.

In order to render this clear, one of Martin's machines, with a part of an old machine, and bands of equal numbers of cards under each system, were exhibited.

The next point demonstrated was, that like the bulk and weight, the cost of the cards, under the new system, would be greatly reduced.

It was shewn, that by an improved system of punching machinery, the bands could be cut from a design, previously perforated, at the rate of 3000 cards per hour; and any number of duplicates could be produced with equal celerity: it was also stated, that by these means, when a pattern became fashionable, any number of looms might be set to work on it, in about as many days as it had previously required weeks under the old system. The price of the old cards was 6*s*. 9*d*. to 8*s*. 6*d*., and upwards, per 100, for new sets, and 5*s*. 6*d*. for re-cuts; whereas the new paper bands would cost 1*s*. per 100, and 6*d*. per 100 for re-cuts. The comparison of cost of 3000 cards (an average band) would therefore stand thus:—

	Cost.				Weight.		Length.
3000 cards @ 6*s*. 9*d*. per 100	£10	2	6	...	90 lbs.	...	600 ft.
3000 new bands @ 1s. per 100 ...	1	10	0	...	8¾ ,,	...	63 ft. 9 in.

In reference to durability, it was stated, that a band had been in constant work for two years, although used on a heavy waistcoat-piece.

The second paper read was "*An account of the deep sea fishing steamer, 'Enterprise,' with Ruthven's propeller,*" by Mr. D. K. Clark, Assoc. Inst. C. E.

The vessel was described as having been built for the Deep Sea Fishing Association of Scotland, under the direction of the author, the consulting engineer to the company, who had recommended the trial of Ruthven's propeller for fishing uses, in preference to the paddle or the screw, chiefly on account of there being nothing likely to interfere with the fishing-nets; and also because the success of the previous trials of this means of propulsion, on board of boats 30 feet and 40 feet in length, when a speed of 7 miles per hour was attained, appeared to warrant its being tried on a larger scale.

The chief dimensions of the "Enterprise" were stated to be—length on deck, 95 feet; length at the water line, 87 feet; breadth of beam, 16 feet; depth, 8 feet; draught to load water line, 4 feet; burthen, 100 tons. The propelling power was derived from two pairs of horizontal oscillating cylinders, 12 inches diameter and 24 inches stroke (with corresponding air-pumps and condenser), working on a vertical crank-shaft. There was one cylindrical boiler, 6 feet in diameter and 5 feet long, with two through fire-tubes, 22 inches diameter, and 105 return flue-tubes, 5 feet long and 2 inches internal diameter. The propeller consisted of a fan-wheel or centrifugal pump, 7 feet in diameter, with curved blades keyed on to the lower end of the crank-shaft: it revolved horizontally in a water-tight wheel-chamber, into which the water from the sea flowed along a covered passage, or water-chamber, through crescent-shaped openings in the bottom of the hull; and the water was expelled laterally from the fan-wheel, in two continuous streams, by curved pipes with nozzles 10 inches diameter, through the sides of the hull. The nozzles worked in collars affixed to the sides, so that they could be pointed astern or ahead, as required, for forward or backward motion; or vertically downwards, when the vessel was to remain at rest. These changes were made rapidly and easily, as the nozzles alone were operated upon, whilst the engine continued to work at full speed. By setting the nozzles in opposite directions, one pointing ahead and the other astern, the vessel could be turned on the spot, swinging on her beam without the aid of the rudder: the vessel could thus be steered by the nozzles, in case of the rudder being lost or disabled. In fact, the manœuvring of the vessel was entirely in the hands of the persons on deck. The fan-wheel and water passages were entirely of wrought-iron, and all the parts were formed to avoid sudden enlargements or quick turnings, and the consequent absorption of power, in the passages, by friction and eddies.

The motion of the vessel was very smooth, and all tremulousness was avoided by the uniform and continuous action of the propelling streams of water.

In a trial trip with the "Enterprise," on the 16th January, 1854, from Granton to Kirkaldy and back, a distance of 10½ miles each way, the average speeds obtained were 9·69 miles per hour going, and 9 miles per hour returning, giving a total average of 9·35 miles per hour, running against the tide for the greater part of the trip, and with a breeze ahead on the return trip. The engine made 50 revolutions per minute, and was calculated to have exerted 40 indicated H. P., from the observed average pressure of 20 lbs in the boiler, with the valve-gear cutting off at one-sixth of the stroke. The consumption of fuel averaged 5 lbs. of coal per estimated horse-power per hour. On another occasion, in a trial of her speed with one of the Granton and Burntisland ferry-boats, the "Enterprise" kept pace with the ferry-boat, at the regular speed of 12 miles per hour,—the engine making 70 revolutions per minute.

In the estimate of the efficiency of this method of propulsion, with respect to the power applied at the fan-wheel shaft, three sources of loss were admitted:—first, the friction of the water in passing through the fan-wheel and passages; second, the excess of the effluent velocity of the water at the nozzles above the speed of the vessel; and third, the elevation of the water-jet above the sea-level. The first had been found, by careful experiment, with a small model, to amount to 16 per cent. of the power applied to the wheel-shaft; the second was estimated, from the known data, at 12 per cent.; and the third, at 8 per cent.,—making a total loss of 36 per cent., and leaving a useful balance of 64 per cent. of the power applied to the wheel-shaft.

Reference was made, for comparison, to the performances of Appold's pump, and of Barker's mill, as tested by Mr. W. M. Buchanan, of Glasgow. After suitable allowances were made, corresponding to the loss at the nozzles, and the loss by elevation of water, the following per centages of useful effect were arrived at:—Ruthven, 64 per cent.; Appold, 57 per cent.; Barker, 67·8 per cent.; giving a mean of 63 per cent. of the power applied to the wheel-shaft.

The friction of the engine was taken at 20 per cent. of the indicated power on the piston; leaving 80 per cent. delivered at the wheel-shaft. It therefore appeared, finally, that of the whole indicated power of the engine, as applied to work Ruthven's propeller, 50 per cent. was lost by friction and other causes,—leaving a balance of 50 per cent. for useful work done.

It was further argued, that by careful design, and good proportion of parts, so as to reduce the friction of the machine, the excess of velocity of the effluent water, and the elevation of the nozzle, 70 per cent. of the total indicated power of the engine might be utilised by Ruthven's propeller.

The draught of the vessel, during the trial, was stated to be 3 feet 2 inches, and the immersed midship section 40·5 square feet. The united area of the nozzles being 1·09 square feet, the ratio of

the area of propulsion to the immersed section was 1 to 37. To the load water-line the immersed midship section was 55 square feet, and the ratio 1 to 50.

Many advantages of Ruthven's propeller, for large vessels, were pointed out and contended for. Several nozzles could be applied to one vessel,—one acting for another in case of accident; whereas paddles and screws could not be so multiplied; and a number of engines and nozzle-propellers, of moderate size, worked at high speeds, would, it was contended, be less weighty, more compact, and more manageable, for a large vessel, than the huge engines and appurtenances required on the present system.

PROVISIONAL PROTECTIONS GRANTED.

[*Cases in which a full Specification has been deposited.*]

460. Frederick William Alexander de Fabeck, of Norfolk-street, Strand, for the construction of bridges, viaducts, lintels, beams, girders, and other horizontal structures and supports.—[*Dated February 25th.*]

504. Thomas Truscott and Thomas Palmer Baker, of Portsea, for an improved arrangement of steam-engines adapted to screw propulsion.—[*Dated March 1st.*]

515. William Brown, of Glasgow, for an improved mode of obtaining volatile products from bituminous coals and other bituminous substances.—[*Dated March 3rd.*]

519. John Nicholson, of Dublin, for improvements in and applicable to certain descriptions of close kitchen ranges.—[*Dated March 3rd.*]

571. Sanders Trotman, of Portman-square, for an improved alarum-night-clock or time-indicator.—[*Dated March 9th.*]

585. George Appolt, of Sulzbach, Prussia, and Charles Appolt, of Metz, France, for improvements in the manufacture of coke.—[*Dated March 10th.*]

[*Cases in which a Provisional Specification has been deposited.*]

1853.

2389. William Roy, senior, of Cross-Arthurlie, Renfrew, for improvements in the preparation or thickening of colouring matters for printing.—[*Dated October 17th.*]

2434. Charles Nicolas Michel and Augustin Lecomte, of Paris, for certain improvements in windows.—[*Dated October 21st.*]

1854.

17. Julian Bernard, of Regent-street, for improvements in the manufacture of boots and shoes; part of such improvements being applicable to the manufacture of garments.—[*Dated January 3rd.*]

40. Jesse Ross, of Keighley, for improvements in making compounds of chocolate, cocoa, and other ingredients for breakfast and occasional beverages.—[*Dated January 7th.*]

145. Marie Louise Lise Beaudeloux, of Paris, for a self-acting cradle, with improved mattress.—*Dated January 21st.*]

159. Joseph Rowlands, of Birmingham, for an improved fastening to be used instead of buttons, buckles, clasps, snaps, hooks and eyes, and other similar fastenings.

170. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in the preparation and combination of fatty and resinous bodies, and vegetable and other wax, for the manufacture of candles; also in the preparation of a wick to be used for the same,—being a communication.

The above bear date January 23rd.

262. Henry Watson, of High-bridge, Newcastle-on-Tyne, for improvements in the working of brass and copper into forms, and planishing them.—[*Dated February 2nd.*]

267. Peter Armand Le Comte de Fontainemoreau, of South-street, for certain improvements in the construction of buildings,—being a communication.

269. Charles Hastings Collette, of Lincoln's-Inn-fields, for an improved method of reducing ores,—being a communication.

271. James Rogerson, Samuel Rogerson, and James Rogerson, jun., of Manchester, for improvements in machinery or apparatus for embossing, cutting, and perforating textile fabrics.

273. William Longmaid and John Longmaid, both of Beaumont-square, for improvements in the manufacture of vegetable charcoal.

275. Pierre Joseph Meeûs, of Paris, for improvements in the manufacture of threads from or with gutta-percha, and in ornamenting the same.

The above bear date February 3rd.

277. George Mills, of Glasgow, for improvements in the construction of steam-vessels, and in steering the same.

279. James Boydell, of Anchor Iron Works, Smethwick, for an improvement in the beds of reverberatory furnaces, used for puddling iron.

281. Robert Stirling Newall, of Gateshead, for improvements in setting up ships' rigging.

The above bear date February 4th.

283. Thomas Sullivan, of Foot's Cray, for certain improvements in rollers and moulds used in making paper.

285. Benjamin Wrigley Firth, of Oldham, for improvements in the method of stopping railway trains, of working brakes on railway and other carriages, and of communicating signals from one part of a railway train to another.

287. Auguste Louis Nicolas Comte Vander Meere, of Paris, for the manufacture of artificial whalebone, or a substance capable of being employed as a substitute for whalebone and tortoise-shell,—being a communication.

289. James Balie Graham, of Glasgow, for improvements in the production of printing surfaces.

291. Walter Neilson, of Glasgow, for improvements in blowing engines.

The above bear date February 6th.

293. John Warburton Moseley, of Heath-fields, for an improved method of uniting glass and argillaceous cylinders and tubes for conducting water and other fluids.

295. John Elce, of Manchester, for certain improvements in machinery for spinning cotton and other fibrous materials.

297. Henry Olding, of Lambeth, for improvements in stoves and fire-places.

299. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in the manufacture of artificial stone,—being a communication.

301. Abraham Pope, of Edgware-road, for improvements in machinery for crushing, grinding, amalgamating, and washing quartz or matters containing gold.

303. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in bleaching textile fabrics,—being a communication.

305. Barthelemy Urbain Bianchi, of Paris, for certain improvements in preventing accidents on railways.

The above bear date February 7th.

307. George Wigzell Knocker, of Bushy Ruff, Dover, for a new method for producing rotatory motive power by means of water. —[*Dated February 8th.*]

308. John Perry, of Leeds, for an improved drilling machine.

309. John Ramsbottom, of Longsight, near Manchester, for an improved hoist for raising and lowering railway rolling stock and other articles.

310. John Dalton, of Hollingworth, for improvements in the construction of bowls or cylinders employed in printing and other processes; and which improvements may also be adapted to other mechanical appliances.

311. Henry Moorhouse, of Denton, Lancashire, for improvements in part of the machinery or apparatus used in preparing cotton, wool, or other fibrous materials to be spun.

312. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in fire-arms,—being a communication.

313. François Vouillon, of Princes-street, Hanover-square, for a new process of protecting the silvering of looking-glasses,—being a communication.

314. James Samuel, of Great George-street, Westminster, and Alexander Woodlands Makinson, of New Palace-yard, for improvements in drying flax, straw, and other fibrous substances.
315. George Tournay, of Newington-causeway, for improvements in obtaining motive power.
316. Eugène Boileau, of Holford-place, Clerkenwell, for improvements in producing raised printing surfaces.
317. Farnham Maxwell Lyte, of Florian, Torquay, for improvements in apparatus for ascertaining the depth of water.
318. Pierre Joseph Meeûs, of Paris, for improved apparatuses for planting grain and seeds, depositing manure, and for performing operations connected therewith,—being a communication.

The above bear date February 9th.

320. David Brown, of Smethwick, and John Brown, of West Bromwich, for an improvement or improvements in the construction and manufacture of axles for railway and other carriages.
321. William Duck and William Wilson, of London-road, Southwark, for an internal gas-heating apparatus.
323. Samuel Hunt and Thomas Morris, both of Long Eaton, for improvements in covering the roofs of buildings with slates, tiles, or other material.
324. Thomas Allcock, of Ratcliffe-on-Trent, for improvements in machinery for cutting straw and other vegetable substances.
325. Benjamin Hornbuckle Hine and Anthony John Mundella, of Nottingham, and Luke Barton, of Hyson Green, Lenton, for improvements in the manufacture of knitted fabrics.
326. James Young, of Glasgow, for improvements in gas making.
327. Jacques Rives, of Hotel Motay, Paris, for improvements in railways and railway carriages.
328. Henry Warner, of Loughborough, and Joseph Haywood and William Cross, of the same place, for improvements in knitting machinery.
329. Joseph Johnson, of Manchester, for improvements in apparatus to be used for the preservation of life at sea.
330. Henry Bridges, of Bridgewater, for improvements in buffers for railway carriages or waggons.
331. James Mitchell, of Dyke Head, for improvements in forcing or distributing liquids.
332. William Whiteley, of Lockwood, near Huddersfield, for improvments in machinery or apparatus for tentering or stretching woollen and other fabrics.
333. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in the manufacture of metallic pens,—a communication.

The above bear date February 10th.

334. Armand Jean Baptiste Louis Marcescheau, of Paris, for improvements in locomotive engines,—partly a communication.

335. Peter Buchan, of Peterhead, for improvements in apparatus for measuring and indicating the distances traversed by carriages.
336. Gregory Bird, of Glasgow, for improvements in the substructures or foundations of buildings.
337. John Jennings, the younger, of Lorton, for improvements in brakes for railway and other carriages.
338. John Getty, of Liverpool, for an improved mode of plating iron vessels.
339. John Rogers, of New York, for the preparation of asphaltum, coal, tar, resin, resin oil, naphtha, and turpentines, for the manufacture of lamp-black.
340. Jacques François Dupont de Bussac, of Upper Charlotte-street, Fitzroy-square, for certain improvements in paving and covering places.

The above bear date February 11*th.*

341. George Ayres, of the City-road, for an improved clip or file, for holding papers or other articles.
342. William Brown, of Albany-road, Old Kent-road, for improvements in printing machinery.
343. Thomas Edwards, of Broad-street, Birmingham, for a new or improved fastening for articles of dress.
344. Alexander Chalmers, of Dundee, for improvements in mangles.
345. Daniel Campbell and James Barlow, of Accrington, for certain improvements in looms.
346. Edmund Clegg, and Edmund Leach, of Rochdale, for improvements in slubbing, spinning, drawing, twisting, doubling, and winding wool, cotton, silk, flax, and other fibrous substances.
347. James Cox, of Wenlock-road, for improvements in knives for cutting paper and other materials.
348. Samuel Russell Brown, of Glasgow, for improvements in printing textile fabrics and other surfaces.
349. William Macnab, of Greenock, for improvements in steam-engines.
350. John Greenwood, of Irwell Springs, near Bacup, for certain improvements in dyeing textile materials or fabrics.
351. John Burt Smith and Edward Smith, both of Regent-street, for certain improvements in bonnets.
352. Alfred Vincent Newton, of the Office for Patents, 66, Chancery-lane, for an improved mode of protecting iron from oxidation,—being a communication.

The above bear date February 13*th.*

353. Thomas Bury, Walter Glover, James William Speed, and John Hardman, all of Salford, for improvements in machinery or apparatus for stretching, dyeing, and finishing yarn and woven fabrics composed of cotton, wool, silk, or other fibrous materials.
354. William Scaling, of Old Basford, for improvements in ma-

chinery for cutting and ornamenting skeins to be used in the manufacture of baskets and other wicker work.

355. Louis Faure, of Paris, for improvements in the process for manufacturing iodine.

356. Charles Augustus Holm, of Cecil-street, Strand, for improvements in propelling.

357. Thomas Irving, of Mould Green, near Huddersfield, for improvements in obtaining a metallic and lustry appearance to fabrics and yarns.

358. Samuel Perkes, of Walbrook, for improvements in valve-cocks,—being a communication.

359. Arthur Jonson, of Mitcham, for improvements in preparing barley and grits or groats.

360. George Wilson, of Sheffield, for an improvement in axle-boxes.

361. Patrick O'Connor, of Wavertree, near Liverpool, for an improved lever hinge for suspending and closing doors and gates.

The above bear date February 14*th.*

362. John Hossell, of Salford, for improvements in machinery or apparatus for washing, scouring, and squeezing leather or other similar substances.

363. John Potter, of Manchester, for an improvement or improvements in machinery for preparing, spinning, and twisting cotton or other fibrous substances; applicable also to machinery for winding threads or yarns of the same.

364. William Asbury, of Birmingham, for an improvement or improvements in forks for agricultural and other purposes.

365. Benjamin Hornbuckle Hine, Anthony John Mundella, and William Onion, all of Nottingham, for improvements in machinery for the manufacture of textile and looped fabrics.

366. Octavius Barrett, of Wimpole-street, for an improvement in the construction of tobacco-pipes.

367. Thomas Jennings, of Brown-street, Cork, for improvements in stoppers for bottles.

368. John Wren, of Tottenham-court-road, for an improved construction of folding-chair bedstead.

369. George Fergusson Wilson, of Belmont, Vauxhall, for improvements in preparing an oil, and in the manufacture of candles and night-lights.

The above bear date February 15*th.*

370. Francis Preston, of Manchester, for improvements in flyers for machinery for preparing flax and certain other fibrous materials.

371. Cromwell Fleetwood Varley, of Charles-street, Somers-town, for a new arrangement or apparatus for transmitting electric telegraph signals.

372. John Bush, of Derby, for improvements in locks and lock furniture.

373. John Greenwood, of Irwell Springs, near Bacup, and Robert Smith, of Bacup, for certain improvements in sizeing, stiffening, and finishing textile materials or fabrics.
374. Thomas Summerfield, of Birmingham, for the manufacture of chromatic glass and glass-faced bricks; which said bricks are applicable to face-work or fronts of buildings, basements, pilasters, string courses, door and window heads, medallions, cornices in part or whole, or other purposes where a superior finish and durability are required; a part of which is also applicable to bricks made wholly of clay.
375. John Davie Morries Stirling, of Larches, near Birmingham, for improvements in the manufacture of steel.
376. James Pritchard, of Portsea, for improvements in the construction of screw-propellers and machinery for driving the same.
377. George Fergusson Wilson, of Belmont, Vauxhall, for an improvement in the manufacture of lubricating matters.

The above bear date February 16th.

378. Thomas Fawcett the younger, of Lisburne, county Antrim, Ireland, for improvements in weaving linen or other fabrics to produce plaits or folds therein.
379. Thomas Telford Macneill, of Mount-pleasant, Lowth, for improvements in drying flax, straw, and other organic substances.
380. Alfred Ford, of Lowndes-street, Belgrave-square, for certain improvements in manufacturing varnish.
381. Henry Ross, of Nottingham, for improvements in machinery for the manufacture of textile and looped fabrics.
382. William Wright, of Wolverhampton, for improvements in ornamenting walls and other similar surfaces.
383. George Smith, jun., of Belfast, for improved machinery for retarding and stopping railway carriages.
384. George Wethered, of Maidenhead, for improvements in machinery or apparatus for shaking straw.
385. Joseph Hinchliffe, jun., of Dam Side, near Halifax, for certain improvements in metallic pistons for tightening or adjusting the packing of the same, and also improvements in the construction of such pistons,—being a communication.
386. Robert Holt, of Shaw, near Oldham, for certain improvements in machinery or apparatus for manufacturing bricks and tiles.
387. Ellis Rowland and James Rowland, both of Wakefield-street, Manchester, for improvements in cleaning the tubular flues of steam-boilers.
388. Moses Poole, of Avenue-road, Regent's-park, for improvements in boiler furnaces and other furnaces,—being a communication.

The above bear date February 17th.

389. Peter George Harris, of Buckingham-street, Adelphi, for improvements in locomotive engines,—being a communication.

390. William Morrison, of Bowling, Dumbarton, for improvements in railway wheels.
391. John Collis Nesbit, of the Chemical and Agricultural College, Lower Kennington-lane, for improvements in the manufacture of manure.
392. Benjamin Weston Wells, of Windmill-lane, Camberwell, for improvements in printing floor and other cloths.
393. Edward Loysel, of Rue de Grétry, Paris, for improvements in apparatus for obtaining infusions or extracts from various substances.
394. Bashley Britten, of Anerley, for improvements in crushing, pulverizing, and washing mineral earths or ores, and amalgamating the gold and silver contained therein; which said improvements are also applicable to crushing and pulverizing other substances.

The above bear date February 18th.

395. John Reed Hill, of Princes-street, Stamford-street, for improvements in machinery for pulverizing metallic ores, or other similarly hard substances.
396. Nicholas Riggenbach, of Basel, Switzerland, for apparatus for preventing incrustation in steam-boilers.
397. William Henry Barlow, of Derby, for improvements in securing and connecting the rails of railways.
398. John Aspinall, of King William-street, London, for an improvement in machinery employed in the manufacture of sugar.
400. Thomas Gray, of Saint Clement's-lane, London, for improvements in the manufacture of pulp from wood.
401. John Chisholm, of Holloway, for improvements in the purification of gas.
402. James Beall, of Effingham-place, Cheshunt, for improvements in apparatus for suspending looking-glasses in frames.
403. Harvey Hilliard, of Glasgow, for improvements in apparatus for cleaning and sharpening table cutlery.
404. Thomas Towers, of Salford, for certain improvements in marking boards used in connection with billiard and bagatelle tables, for registering and indicating the number of games played.
405. William Milner, of Liverpool, for certain improvements in locks for safes; which said improvements are applicable to locks in general.
407. John Urie, of Glasgow, for improvements in photographic pictures.

The above bear date February 20th.

408. John Ramsbotton, of Longsight, near Manchester, for improvements in welding.
409. Frederiek Osbourn, of Aldersgate-street, for certain improvements applicable to the cutting out of garments.
410. Henry King, of Gilbert-street, Oxford-street, for an improved

mode of signalizing between the guard and driver of a railway train.

411. John Gedge, of Wellington-street South, Strand, for improvements in the construction or adaptation of certain fittings for gas,—being a communication.

412. Victor Pernollet, of Broad-street, Golden-square, for improvements in machinery or apparatus for sorting or separating wheat and other grain from different kinds of grain, and for separating or removing extraneous matters from wheat and other grain.

413. Stopford Thomas Jones, of Union-court, Old Broad-street, for improvements to reduce and wash minerals to extract metal therefrom, especially gold.

414. Robert Walker, of Glasgow, for improvements in signalling by voltaic electricity, for the purpose of increasing the safety of railways.

415. James Boydell, of Gloucester-crescent, Regent's-park, for an improvement in the manufacture of hurdles and gates.

416. Ernst Gessner, of Aue, near Schneeburg, Saxony, for imments in Gig Mills.

417. James Smith, of Glasgow, for improvements in ornamental weaving.

418. John Henry Johnson, of Lincoln's-Inn-fields, for improvements in machinery for making matches,—being a communication.

419. Adam Dixon, of Smethwick, for improvements in railway axle boxes and bearing springs.

420. Adam Dixon, of Smethwick, for improvements in timber scaffolding or stageing.

421. Anthony Bernhard Baron Von Rathen, of Wells-street, for improvements in omnibuses for the purpose of adapting them to be drawn by one horse and to be attended by one man only.

422. William Gossage, of Widnes, for improvments in the manufacture of certain alkaline carbonates, and in the useful application of such carbonates.

423. William Charles Theodor Schaeffer, of Stanhope-terrace, for an improved mode of recovering the fatty matters contained in waste waters of woollen mills.

The above bear date February 21st.

424. William Edward Newton, of the Office for Patents, Chancery-lane, for improvements in fire-arms and in projectiles,—being a communication.

425. James Morison, of Paisley, for improvements in celestial and terrestrial globes.

426. Edward Taylor, of Kinghorn, North Britain, for improvements in gill-heckles or combs for treating fibrous materials.

427. Damiano Assanti, of Upper Berkeley-street, for a means of rendering porous substances waterproof.

428. Edward Massey, of Tysoe-street, Clerkenwell, for improvements in ships' logs, known as "Massey's patent ships' logs."
429. Samuel Colt, of Spring-gardens, for improved machinery for rifling fire-arms,—being partly a communication.
430. James de Wolfe Spurr, of Kenyon-terrace, Birkenhead, for improvements in distilling coals and bituminous and resinous substances and products thereof.
431. James Boydell, of Gloucester-crescent, Regent's-park, for improvements in applying apparatus to carriages, to facilitate the draft.

The above bear date February 22nd.

432. Thomas Settle and Peter Cooper, both of Bolton-le-Moors, for certain improvements in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous materials.
433. Adolphus Oppenheimer, of Manchester, for certain improvements in the manufacture of mohair velvet, or mohair plush.
434. Thomas Robinson, of St. Helen's, Lancashire, for improvements in machinery or apparatus for raising and lowering goods.
435. Joseph Barling, of Maidstone, for improvements in treating the hop bine, and rendering it applicable to the manufacture of paper and other articles.
437. Thomas Danson Pruday, of Rupert-street, Haymarket, for improved apparatus for cooling liquids and edible substances.
438. William Hunt, of Lea Brook Chemical Works, near Wednesbury, for improvements applicable to the utilizing of ammonia given off in certain manufacturing processes.
439. Hugh Stoy, of St. John's-road, Battersea-rise, for stopping of engines and carriages on railways; and also vehicles of every description on the common roads.
440. Edward Foard, of Nicholas-street, New North-road, for improvements in furnaces.

The above bear date February 23rd.

441. Peter Fairbairn, of Leeds, for a certain improvement in machinery for winding slivers of flax, tow, or other vegetable fibrous materials into laps or balls.
442. William Ryder and James Ryder, of Bolton-le-Moors, for an improved composition applicable to coating metals.
443. Edward Kingsbury, of Knightsbridge, for improvements in apparatus for indicating ihe rise or fall of water or other liquids in ships' holds, tidal harbours, or other vessels or places.
444. Samuel Little Hardy, of Dublin, for an improved apparatus for applying chloroform vapour or other similar vapour in certain cases.
446. Charles Cowper, of Southampton-buildings, for improvements in furnaces,—being a communication.
447. Charles Cowper, of Southampton-buildings, for improvements in the manufacture of potash and soda,—being a communication.

448. John Banfield, of Birmingham, for improvements in apparatus for communicating (while riding) with the drivers or guards of public or private vehicles.

451. Cyril Jeddere Fisher, of the Temple, for improved means of detecting forged or counterfeit bank notes, bills of exchange, cheques, or other documents, labels, or trade marks.

452. Edward Hammond Bentall, of Heybridge, for improvements in ploughs or implements for cultivating land.

The above bear date February 25th.

New Patents.

Sealed under Patent Law Amendment Act, 1853.

1299. John Box.
1944. James Kimberley.
1954. Victor E. Warmont.
1964. William Mann.
1968. George Culverhouse.
1971. G. Pollard and G. Mumby.
1972. A. A. De Reginald Hely.
1973. Alfred Swonnell.
1978. J. Shaw and J. Steinthal.
1979. George Davis.
1981. R. A. Brooman.
1987. William Hargreaves.
2000. Joseph Cundy.
2003. P. A. Le Comte de Fontainemoreau.
2004. J. H. Johnson.
2010. Joseph Cundy.
2015. E. W. Burrows.
2019. Edward Smith.
2022. W. B. Johnson.
2031. J. P. Pritchett.
2038. Albert Nagles.
2043. J. Smalley and W. Smirk.
2048. L. W. Wright.
2051. Henry Wilkinson.
2053. T. Pope and E. Bufton.
2054. A. Somerville and C. Twigg.
2055. I. Smith and A. Somerville.
2056. J. Alsop and E. Fairburn.
2058. David Law and J. Inglis.
2062. B. Hustwayte and R. J. P. Gibson.
2068. James Coate.
2071. P. A. Le Comte de Fontainemoreau.
2072. Jonas Radford.
2080. Charles Askew.
2086. A. V. Newton.
2089. Arthur Warner.
2092. John Grist.
2103. William Weild.
2104. J. W. Child and R. Wilson.
2107. John Lilley, jun.
2112. Charles Cannon.
2116. Henry Dubs.
2118. Alexander Allan.
2119. James H. Dickson.
2125. J. Wakefield and J. Baskerville.
2127. Philip Webley.
2128. John Timmis.
2129. A. Wallace and G. Galloway.
2132. James Higgin.
2139. William Nash.
2141. Eliezer Edwards.
2142. Thomas Browning.
2143. Henry Kraut.
2144. Thomas W. Keates.
2147. Henry Jeanneret.
2152. David Mushet.
2153. William S. Icely.
2154. Henry Meyer.
2155. William Carron.
2159. A. Thomson & D Lockerbie.
2160. John Adcock.
2164. Jonathan Burton.
2166. C. Nickels and R. Selby.
2168. Baron Henry De Bode.
2169. R. A. Brooman.
2172. William L. Anderson.
2174. Thomas Restell.
2177. Henry Walker.
2182. William Stockil.
2193. Edward Oldfield.
2194. Thomas W. Walker.
2196. S. A. Benetfink.
2197. James Leetch.
2204. Alexander Dalgety.
2220. L. D. Girard.
2221. John Barsham.
2222. J. H. Johnson.
2227. Jean A. Labat.

2228. M. O. B. Lesage.
2230. H. J. Iliffe, J. Newman, and H. Jenkins.
2233. Thomas William Kennard.
2240. John Taylor.
2241. Caleb Bloomer.
2252. William Brown.
2253. M. Dwyer and J. Brown.
2270. J. L. Norton.
2283. J. H. Cary.
2285. M. F. De Castro.
2286. A. E. Hargrove and Ralph Richardson.
2306. Henry Dubbs.
2332. W. M. Campbell.
2381. C. J. L. Cloux.
2385. Antoine Corvi.
2420. A. A. Beaumont.
2436. P. M. Fouque, L. R. Hébert. and V. E. Doret le Marneur,
2462. A. V. Newton.
2500. James Nasmyth.
2505. Andrew Maclure.
2512. P. M. Parsons.
2518. Richard Restell.
2535. F. A. Gatty.
2542. Benjamin Butterworth.
2616. H. Kilshaw and R. Hacking.
2624. H. Kilshaw and R. Hacking.
2651. J. W. Wayte.
2671. R. Griffiths.
2690. Moses Poole.
2710. William Mee.
2719. Benjamin Burleigh.
2733. Hugh Mason and Jno. Jones.
2751. A. E. L. Bellford.
2752. C. C. A. Grenier.
2758. G. E. Gazagnaire.
2763. T. Chambers & J. Chambers.
2782. John Elce.
2783. P. A. Le Comte de Fontainemoreau.
2794. A. E. L. Bellford.
2803. H. Deacon and E. Leyland.
2827. Edward Lavender.
2840. W. Slater and R. Halliwell.
2841. L. H. Bates.
2859. P. M. Fouque, L. R. Hébert, and V. E. Doret le Marneur.
2871. William Schaeffer.
2878. Chas. Coates.
2884. William Thornley.
2901. John Wibberley.
2919. William Binnion.
2921. William Tranter.
2930. Samuel Smith.
2931. Alexander Parkes.
2933. Chas. Goodyear.
2940. Caleb Bedells.
2947. Henry Milward.
2948. J. Tribelhorn & Dr. P. Bolley.
2949. A. E. L. Bellford.
2958. Paul Wagenmann.
2960. E. V. F. Lemaire.
2961. John Webster.
2963. James Burrows.
2985. Francis Bennoch.
2969. T. V. Lee.
2997. F. C. Calvert.
3004. James Taylor.
3008. John Macintosh.
3012. D. Mc Nee & A. Broadfoot.
3014. Henry Jackson.
3016. Mary Phillips.
3017. A. F. Rémond.
3032. C. G. Schönherr.
3033. John Pym.
3035. A. Trueman and J. Baggs.
3036. Richard Waygood.
3041. A. Oppenheimer.

1854.

1. C. H. Collette.
7. Le Comte de Fontainemoreau.
54. A. M. E. Boyer, E. Ducros, and O. Verdeau.
56. Rev. W. R. Bowditch.
57. Elmer Townsend.
63. J. J. W. Watson.
97. Wm. Crosskill.
86. Robert Maclaren.
101. G. F. Wilson.
107. Wm. Crosskill.
108. Edward Highton.
110. Robert Maclaren.
115. Edward Lord.
128. Alexander Dalgety.
134. Nehemiah Hunt.
147. H. Watson.
162. John Lockhart, jun.
168. A. E. L. Bellford.
178. John Ridgway.
181. John Bapty.
2332. W. M. Campbell.
2505. Andrew Maclure.
2651. J. W. Wayte.
2783. P. A. Le Comte de Fontainemoreau.
2958. Paul Wagenmann.
3008. John Macintosh

*** *For the full titles of these Patents, the reader is referred to the corresponding numbers in the List of Grants of Provisional Protections.*

CELESTIAL PHENOMENA FOR APRIL, 1854.

D.	H.	M.	
1			Clock before the ☉ 4m. 0s.
	—		☽ rises 7h. 15m. M.
	—		☽ passes mer. 3h. 4m. A.
	—		☽ sets 11h. 8m. A.
	5	23	♄ in conj. with the ☽ diff. of dec. 1. 29. S.
4	5		☽ in Apogee
	—		Occul. x Geminorum, im. 12h. 50m. em. 13h. 2m.
	20	9	☿ stationary
	23	23	♀ at greatest brilliancy
5			Clock before the ☉ 2m. 48s.
	—		☽ rises 9h. 33m. M.
	—		☽ passes mer. 6h. 21m. A.
	—		☽ sets 2h. 18m. M.
	3	22	☽ in □ or first quarter
	15	36	☿ in descending node
6	5	6	♃'s first sat. will im.
8	5	7	♃'s fourth sat. will em.
8	13	34	♂ in conj. with the ☽ diff. of dec. 2. 21. S.
9	19	32	♂ stationary
10			Clock before the ☉ 1m. 22s.
	—		☽ rises 3h. 22m. A.
	—		☽ passes mer. 10h. 21m. A.
	—		☽ sets 4h. 47m. M.
	—		Occul. *B.A.C.* 3996, im. 14h. 23m. em. 15h. 52m.
12	2	36	♃'s second sat. will im.
13	5	37	Ecliptic oppo. or ○ full moon
14			Mercury, R. A., 23h. 55m. dec. 2. 21. S.
	—		Venus, R. A., 22h. 47m. dec. 5. 33. S.
	—		Mars, R. A., 10h. 5m. dec. 14. 38. N.
	—		Vesta, R. A., 10h. 12m. dec. 21. 6. N.
	—		Juno, R. A., 11h. 8m. dec. 7. 56. N.
	—		Pallas, R. A., 19h. 41m. dec. 13. 24. N.
	—		Ceres, R. A., 20h. 52m. dec. 22. 48. S.
	—		Jupiter, R. A., 19h. 52m. dec. 21. 5. S.
14			Saturn, R. A., 3h. 52m. dec. 18. 28. N.
	—		Uranus, R. A., 2h. 36m. dec. 14. 56. N.
	—		Mercury passes mer. 22h. 24m.
	—		Venus passes mer. 21h. 17m.
	—		Mars passes mer. 8h. 34m.
	—		Jupiter passes mer. 18h. 20m.
	—		Saturn passes mer. 2h. 22m.
	—		Uranus passes mer. 1h. 7m.
	—		Vesta stationary
	—		Occul. 28 Libræ, im. 16h. 34m. em. 17h. 3m.
15			Clock before the ☉ 0m. 3s.
	—		☽ rises 10h. 17m. A.
	—		☽ passes mer. 1h. 35m. M.
	—		☽ sets 6h. 10m. M.
	4	49	♃'s third sat. will em.
	19	29	☿ in Aphelion
16	1	20	♃ in □ with the ☉
	5		☽ in Perigee
19	5	37	♃ in conj. with the ☽ diff. of dec. 4. 9. N.
20			Clock after the ☉ 1m. 7s.
	—		☽ rises 2h. 48m. M.
	—		☽ passes mer. 6h. 35m. M.
	—		☽ sets 10h. 28m. M.
20	5	7	☿ greatest elong. 27. 14. W.
21	18	8	Pallas in □ with the ☉
22	20	1	♀ in conj. with the ☽ diff. of dec. 6. 15. N
23			Occul. 33 Piscium, im. 15h. 39m. em. 16h. 30m.
24	10	47	☿ in conj. with the ☽ diff. of dec. 1. 36. N.
25			Clock after the ☉ 2m. 7s.
	—		☽ rises 4h. 33m. M.
	—		☽ passes mer. 10h. 43m. M.
	—		☽ sets 5h. 8m. A.
27	4	11	♅ in conj. with the ☽ diff. of dec. 1. 27. N.
	6	14	Ecliptic conj. or ● new moon.
28	14	12	♀ in the descending node
	19	29	♄ in conj. with the ☽ diff. of dec. 1. 47. S.
30			Juno stationary

J. LEWTHWAITE, Rotherhithe.

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No. CCLXIX.

RECENT PATENTS.

To Charles Tiot Judkins, *of Britannia Works, Manchester, for improvements in machinery or apparatus for sewing or stitching.*—[Sealed 16th October, 1852.]

This invention relates to an improved arrangement and combination of machinery for sewing or stitching by a needle and shuttle, and regulating the supply of the silk or thread to the needle and shuttle, so as to keep it to a proper tension during the operation of sewing or stitching, with a means of enabling the mechanism to accommodate itself to different thicknesses of silk, thread, or material.

In Plate IX., fig. 1, is a side elevation of the improved machine, with the outer plate taken off, in order to shew the working parts in the interior thereof; and fig. 2, is a front view of the same. *a*, represents the frame of the machine; *b*, the handle and fly which turn the shaft *c*, carrying the cam *d*, which moves the larger bell-crank *e*,—giving vertical motion to the needle-guide or carrier *f*. *g*, is another cam on the shaft *c*, which turns the bell-crank *h*,—giving motion to the shuttle *i*. Fig. 3, is the shuttle-spool or bobbin, for supplying silk or thread to the shuttle; and in the hollow axle of this bobbin is a spiral spring for controlling the supply. *k*, is a spool or bobbin, from which the thread or silk is conveyed to the perpendicular needle-carrier *f*. *l*, is a notched bar or bearing, on which the material to be sewn rests; which material is held to it by the spiral spring *m*, pressing the plate *n*, upon the material, and keeping it in the required position. *o*, is a small spring-plate on the carriage *m*, which

prevents the material from rising, or the stitch being missed when a seam or increased thickness of material presents itself. *p*, is a presser-pad, with an incline, for the purpose of holding the thread or silk, and preventing a loop or bow forming behind the needle, during its downward motion. *q*, is a small cross-bar with perforations, through which the different thicknesses of thread or silk pass, and may be regulated as the inclined presser may require. On the cam *d*, are projections, shewn at *r*, which act upon one end of the smaller bell-crank *s*, which is kept up to its work by the spring *t*: the other end of the crank *s*, acts upon the inclined pressure-pad *p*. The silk or thread, passing from the spool or bobbin to the vertical needle, is regulated by the regulator *u*, turning on the pin *v*, which makes a slight pressure on the silk or thread as it descends with the needle, and passes through the eyelet-hole *w*, and is twisted round the wire by the pin *v*, and then passes through another eyelet-hole *y*, and, through a guide connected with the needle-carrier, to the eye near the point of the needle, as before stated.

The patentee claims the combination and arrangement of the various parts of machinery for sewing or stitching with the use of a needle and shuttle; the methods of regulating the supply of the thread or silk to the needle and shuttle; the arrangement for accommodating the machinery to the different thicknesses of the thread or silk; and the means of preventing the material rising, or the missing of the stitch when different thicknesses present themselves, as herein described and illustrated.

To John Henry Johnson, *of Lincoln's-inn-fields, for improvements in machinery or apparatus for sewing and stitching,—being a communication.*—[Sealed 11th November, 1852.]

This invention relates to certain improved arrangements of machinery for sewing or stitching woven fabrics or other materials, whether for effecting the junctions thereof, or for ornamenting the same; with the view of effecting such objects more efficiently and economically than has been hitherto done.

In Plate IX., fig. 1, is a front view of the improved sewing machine, complete for use; fig. 2, is a vertical section of the machine; fig. 3, is a plan view; and fig. 4, is a separate enlarged elevation of a portion of the shuttle actuating mechanism. The apparatus is fitted to the table A, and carries

the necessary bearings for the lower movements, and the secondary thread apparatus; whilst an overhanging bracket B, is bolted down upon the table face to carry the primary thread action. The machine is driven by the winch C, keyed to a small fly-wheel connected with a spur-wheel D, which runs loose on a stud bolted into the bracket E, on the main table. This wheel gears with two other smaller wheels F, and G, which are respectively keyed on the projecting ends of the two shafts H, and I. The upper shaft H, passes along through an opening in the upper horizontal arm of the bracket B, projecting into the space in the forked end of the bracket. This end of the shaft has fastened to it a crank J, the pin K, of which projects into the differential groove or slot K^1, in the inner face of the slotted piece L, shewn in dotted lines at fig. 1; and which slotted piece is fixed to the side of the vertical needle-carrier M, for the primary thread N: or the requisite differential motion may be obtained by fixing the stud-pin in the needle-carrier, and keying fast on to the end of the shaft A, a cam or disc, suitably shaped or grooved to give the movement required. This needle-carrier is of considerable length, and is arranged to traverse vertically in a guide-groove, between the face of the bracket projections and the front holding-plate O, bolted thereto; the needle P, being clamped to the lower end of the holder by an eye-piece Q. This eye-piece answers also as the lower guide for the thread. The primary thread is contained on the bobbin R, set on a fixed stud in the bracket-piece B; the stud having a thumb-nut and friction arrangement for giving any required amount of tensional "drag." As the thread unwinds from this bobbin, and is taken up by the succession of stitches, it may pass, when required to be lubricated, through a small reservoir of wax or lubricating material S; it being guided by suitable eyes into and through the material; after which it enters an eye T, in the back end of a horizontal guide-arm T^1. This arm is screwed at U, to the face-plate O. As the thread passes through the eye T, it takes one or two turns round the guide-arm, as a further drag; such turns being variable by turning the adjustable spring-clip V, embracing the arm. Thence the thread passes through the eye W, at the angle of the guide-arm, and it finally enters the eye X, which travels with the needle-holder. By this means the attendant can easily adjust the length of thread to be taken off the bobbin at each stitch, by turning round the nut U, to bring the guide-arm farther off or nearer to the eye X, when the latter is at the top of its stroke, for example. The thread then passes down inside the spring-

guide Y, and thence through the guide-eye Q, which leads it to the needle eye. The inner end of the lower shaft I, carries a stud, disc, or crank Z, the stud-pin of which projects into the differential slot of the slide-piece *a*, (see fig. 4,) which traverses in the dovetail guide *b*, made fast to the framing. This slide-piece carries a vertical arm *c*, which terminates at its upper end in a horizontal forked driver *d*. This driver partially encloses the shuttle *e*, which has a slight play between its two forks or curved ends. By this means there will always be a sufficient space between one end of the driver and the shuttle for the free passage of the loop, as will be more fully described hereafter. The shuttle *e*, of the secondary thread slides in a grooved guide or shuttle-race *f*, and is fitted with a bobbin of thread of its own. The material to be stitched is represented at *g*. It is traversed forward along the line of the intended seam, by being pressed upon the roughened surface of the cloth propeller *h*, which works on a fixed stud-centre, adjustable in the slotted bracket *i*. The material to be stitched is held down upon the periphery of the propeller by the curved plate *j*, and helical spring *k*. The holding-plate is secured to the lower extremity of the vertical sliding-bar *l*, which is guided by the fixed pieces *m*, m^1. A moveable catch *n*, is fitted loosely to the upper end of the bar, and serves to retain it elevated, when not in use, by resting upon the surface of the upper guiding-pin *m*. The propeller is actuated by the lever arm *o*, which is keyed on to the short rocking-shaft *p*, working in the frame A. Through the lower extremity of this arm is passed the short screwed spindle or piece of wire *q*, which is fitted with an adjusting nut *r*. The opposite end of this spindle is hooked, and has secured to it one end of the cord or gut *s*, which passes round the propeller in a suitable groove: the other end of this cord is secured to the fixed bow-spring *t*, carried by the small bracket *u*. A second arm *v*, is keyed on to the rocking-shaft *p*, and extends beneath the tappet *w*, on the shaft I. At each revolution of this shaft the tappet depresses the lever-arm *v*, and thereby draws the cord *s*, and wire *q*. This movement turns the propeller slightly; the spring *t*, allowing the cord or gut to give, according to the length of stroke of the arm *o*, which is regulated by the nut *r*. It will be obvious that the length of the stitches will depend on the degree of movement given to the propeller; and therefore the nut *r*, is employed for regulating the stitches according to the kind of work required. The wooden chock *x*, acts as a detent inside the propeller: it is pressed against the interior of the rim *y*, by the bow-springs

z, z,—thereby serving to hold the propeller firm during the formation of the stitch, and preventing it moving backward without interfering with its forward motion, when required.

In sewing by this machine, the material is guided by hand, according to the direction of the seam, and traverses beneath the plate J,—being held down by the spiral spring *k*. The descent of the needle-holder M, inserts the needle P, into the material; carrying with it the thread N. By a peculiar differential motion the needle then makes a slight upward movement, to form a loop beneath the material. Through this loop, the shuttle *e*, with its thread, is thrown; and one thread is thus locked in the other. After the shuttle has passed through the loop formed beneath the material to be stitched, it makes a pause or dwell in its course; and its forked driver *d*, then makes a slight backward movement, to allow the primary thread N, to pass freely over the back portion of the shuttle. The tightening or drawing of the stitch is effected by three distinct and simultaneous movements; viz., a further rising of the needle P; the further onward movement of the shuttle *e*, in one direction; and the forward motion of the material *g*, in the opposite direction. The shuttle then traverses back again, and is ready for a second stitch. In order to keep the thread N, at a proper degree of tension in the needle, a self-acting catch 1, (see fig. 1,) fitted to the side of the fixed bracket B, works loosely upon a screw 2; and one end 3, of this bent catch presses against the thread; thereby preventing the thread becoming slack above the material, and keeping it well distended during the insertion of the needle. This catch is actuated and made to press upon the thread N, at each descent of the needle, by a small projection 4, on the side of the disc J.

The patentee remarks that he does not restrict himself to the precise details or arrangements which he has had occasion to describe or refer to, as many variations may be made therein, without deviating from the principles or main features of the invention.

To Alfred Vincent Newton, *of the Office for Patents, 66, Chancery-lane, mechanical draughtsman, for an improved sewing machine,—being a communication.*—[Sealed 18th January, 1853.]

This invention consists in an arrangement of machinery, wherein a bearded needle is employed for throwing a line of looped stitches into the fabric that is required to be stitched.

The fabric to be operated upon is hung upon pins projecting from two circular racks, which move in grooves formed in the face of a circular frame. These racks are driven by pinions taking into their teeth; and thus the fabric is passed under the action of the needle, which, having a quick reciprocating motion, similar to that of the needles of stocking-frames, and being in like manner supplied with thread, is passed backwards and forwards through the fabric; whereby a chain of loops is left on the inner face thereof. Carried by the same arm is a stiletto, which pierces holes in the fabric, to allow of the needle passing freely through the same.

In Plate IX., fig. 1, represents this improved construction of sewing machine in plan view; fig. 2, is a sectional elevation, taken in the line 1, 2, of fig. 1; fig. 3, is a side elevation, with a portion of the framing broken away; and fig. 4, is a cross section, taken at or near the line 3, 4, of fig. 1.

The frame of this machine consists of a bed-plate *a*, and a circular rim *b*, *b*, by which it is surrounded. In the outer face of this rim two annular grooves or recesses are formed, for the reception of two circular racks *c*, *c**, which are furnished with tenter-pins to receive the fabric to be operated upon, and hold it at tension while it is being carried forward under the action of the needle. Gearing into the lower rack *c*, is a pinion *d*, which is keyed to a shaft *e*, supported by bearings on the under side of the bed-plate. Rotary motion is communicated to this pinion by the means to be presently explained; and this motion is transmitted through a pinion *d**, (carried by a stud in the frame *a*,) to the upper rack *c**. *f*, *f*, are standards bolted to the bed-plate, and carrying a shaft *g*, on which a cam-wheel *h*, a driving-pulley *i*, and a fly-wheel *k*, are keyed. In contact with one face of this cam-wheel is an antifriction bowle *l*, which is carried by a bell-crank lever *m*, the fulcrum of which rests in lugs projecting from the under side of the bed-plate. This bowle *l*, is allowed to come into contact with the cam by reason of a slot which is cut in the bed-plate immediately below the cam-wheel; and it is kept up to its bearing position by means of a helical spring from a fixed stud in the frame being attached to the tail of the bell-crank lever. Jointed to the tail end of the lever is a pawle or click *n*, which takes into the teeth of a ratchet *o*, on the shaft *e*. When, therefore, the shaft *g*, is rotated, and the increasing diameter of the cam-wheel *h*, is brought to bear upon the bowle *l*, the crank-lever which carries the bowle will be rocked, and the pawle driven forward and made to turn the ratchet *o*. But as this ratchet *o*, is keyed on the same shaft

as the pinion *d*, an axial motion will be imparted to that pinion, and, through it, the racks *c*, and *c**, will be made to slide in their grooves, and carry forward the fabric under the action of the needle. The vertical acting face *h**, of the cam-wheel is formed as shewn at fig. 5, and is intended to give the forward and backward movement to the needle. To this end a vibrating lever *p*, which works on a fulcrum-pin projecting downwards from the bed-plate, is furnished at one end with a bowle, which bears against the cam-face *h**, and at its other end it carries a pin, which takes into a saddle-piece q^1, affixed to the under side of a rod *q*, to the outer end of which the bearded needle *r*, is attached. This needle rod *q*, is secured to the plate *a*, by guides, which are bolted thereto, and permit the rod to slide freely upon the bed-plate when motion is communicated to the rod from the cam *h*, through the vibrating lever *p*. The bed-plate is slotted immediately below the needle-rod *q*, (see fig. 2,) to allow of the projection through the plate of the saddle-piece q^1, and of a pin q^2, also attached to the rod *q*, and connected to the central stem of the bed-plate by a helical spring q^3, which ensures the quick return motion of the rod with its needle *r*. The rim *b*, is pierced with two small holes (see the detached sectional views, figs. 6, and 7,), one of which is to allow of the passage through the rim of the needle. To permit of the needle passing freely through the fabric to be stitched, the bar is fitted at its outer end with a stiletto, set abreast of the needle, and at a distance therefrom equal to the length of the stitch to be formed. The second small hole in the rim is to permit of the free passage to and fro of this stiletto. It will now be understood that when the needle is driven outwards, the stiletto will accompany it, and pierce a hole through the fabric in advance of the operation of the needle, and ready for its admission at the next outward thrust of the rod *q*. Bolted to the rim *b*, and adjacent to the needle is a bracket *s*, which carries a guide-piece *s**, pierced with holes, corresponding to the holes made in the rim, for the passage through of the needle and stiletto. This guide-piece stands a little distance beyond the rim, sufficient to allow of the fabric to be stitched passing freely between the two; and it is intended to depress the beard of the needle when the needle is making its return motion; which operation is effected by reason of the small diameter of the hole through which the needle is passed. The outer end of the hole is chamfered, to permit of the free ingress of the needle. Affixed to one of the guides of the rod *q*, is a spring thread-carrier *t*, which receives a slight up-and-down motion, for the purpose of laying the thread

under the beard of the needle. The upward movement of the thread-carrier takes place as the needle moves inwards; and it is effected by a bowle *u*, which is mounted on the needle-rod *q*, being brought to bear upon a raised piece on the under side of the thread-carrier. On the recession of this bowle, a coiled spring, connected at one end of the bed-plate, and at the other to the thread-carrier, draws down the carrier to its lowest position. The thread is taken from a reel *v*, and passed under a binding spring *w*, to keep it at tension; thence over a fixed pin *x*, to the threaded carrier, the extremity of which is provided with an eye to receive the thread. In working this improved sewing machine, the fabric to be stitched is first stretched upon the tenter-pins of the circular racks *c*, *c**, and rotary motion is then communicated by a band from any first mover to the pulley *i*, in the direction of the arrow. The cam *h**, will now, through the intervention of the vibrating lever *p*, drive out the needle bar, and cause the needle to enter and pass through the hole last pierced by the stiletto. As the cam projection passes from under the bowle of the lever *p*, the spring q^3, will draw back the needle bar, and at the same time cause the bowle *u*, to lift the thread-carrier; by which action the thread will be laid under the beard of the needle. The beard of the needle will now, as the needle retires, be pressed down against its stem by the pressing-plate *s**, and the thread being thereby secured under the beard, will be drawn through the fabric in the form of a loop. The needle being now clear of the fabric, the traverse of the racks *c*, *c**, (with the fabric suspended therefrom) for a distance equal to the length of a stitch, will take place. This traverse is effected, as was before explained, through the agency of the cam *h*, on the periphery of the cam-wheel, the crank-lever *m*, the click *n*, the ratchet-wheel *o*, and the pinions *d*, and *d**; and by this means sufficient thread is drawn off from the needle to form the required length of looped stitch. The continued rotation of the cam will now have brought a second projection on the cam-face *h**, in contact with the bowle of the lever *p*; and the needle will be again thrust forward through the fabric. On returning, as before explained, it will draw a loop of thread through the loop last formed, and thus prevent that loop from running down, when released from the stem of the needle. The beard of the needle being depressed by the pressing-plate *s**, the secured loop will be free to slide off the needle, and this it will do when the needle has arrived at the end of its course. The traverse motion of the fabric is then continued for a distance equal to the length of a stitch, and the like ope-

rations are successively repeated until the completion of a seam. The fabric is then shifted, and the sewing operation is recommenced: by this means, seams composed of chain stitches are produced. This machine may be driven by hand or power; but when driven by power, the driving-pulley should be capable of being thrown out of action with great facility. For this purpose it may be convenient to make the pulley run loose on its axle, and fit on to a conical boss on the cam-wheel (as shewn at fig. 4). Then, by means of a crank-lever *y*, (fig. 1,) provided with a handle *z*, and connected to a forked lever, which embraces the boss of the pulley, rotatory motion may be communicated to the cam-wheel by pressing the driving-pulley on to its conical boss: or the motion of the machine may be suspended by throwing the pulley and cam-wheel out of connection with each other. It will be understood that this machine is constructed to form two stitches for every revolution of the driving-belt.

The patentee claims, First,—the general arrangement of parts, as above set forth, constituting the improved sewing machine. And particularly the use of the bearded needle, pressing-plate, and thread-carrier in combination as above explained.

To John Henry Park, *of Preston, in the County of Lancaster, civil engineer, and* Joseph Park, *of the same place, plumber, for improvements in water-closets and urinals.*—[Sealed 23rd March, 1853.]

This invention relates to certain novel arrangements in connection with the valvular apparatus of water-closets, whether such closets are of the self-acting or of the ordinary construction.

In Plate IX., fig. 1, represents, in vertical section, the improved water-closet, complete, as fitted up in its position for use. Fig. 2, is a longitudinal section of the valvular apparatus, detached; shewing the duplex valve as it stands when the water-closet is occupied; and fig. 3, is a vertical section of the receiver or air vessel, detached. The water-closet basin *a*, is made of the usual smooth glazed earthenware, or it may be enamelled; and the longitudinal section of its sides is of a duplex serpentine curvature, so as to be more effectually cleansed by the operating water than if of the common vase contour. Its neck is made with a bottom collar *b*, so that it may rest steadily on the floor; and beneath this collar the

prolongation of the neck enters the upper end of the usual syphon discharge-pipe *c*. The seat *d*, covering the edges of the basin, as well as the operating mechanism, is moveable; that is to say, it has the power of traversing slightly in a vertical direction. To its under side is attached a pendent rod *e*, jointed at its lower end *f*, to one end or arm of a lever, which is set on a pedestal stud-joint *g*, standing up from the floor; or, instead of this connection with the seat, the valvular apparatus may be similarly connected with the tread-board of the water-closet, or such other convenient part of the closet as shall be easily and safely brought into action, automatically, whenever the closet is being used. The opposite end of the lever *f*, is passed through a slot *h*, in the lower end of the valve-spindle *i*; so that whenever the seat *d*, (or whatever other movement is used,) is pressed upon, the valve is simultaneously acted on. The cylinder *j*, which contains the valve, is placed vertically beneath the fixed part of the closet seat, and its bore is closed up at the top, by an air and water-tight cap-piece *k*, screwed on with a packing ring. The lower end of the cylinder has a stuffing-box *l*, similarly screwed on, for the passage through of the valve-spindle *i*. Near the top of the valve-cylinder is a branch pipe *m*, passing to the water-supply reservoir; this branch is arranged so as to open into the cylinder immediately above the seat *n*, in the cylinder of the upper valve *o*. This upper valve *o*, is formed by screwing a small collar piece on to the extreme upper end of the spindle, and passing an elastic disc of leather or other suitable material down upon the spindle; which disc is secured in place by a top cap screwed upon the spindle end. Beneath the valve-seat *n*, is a wider pipe *q*, branching off to the air vessel or receiver *r*, conveniently disposed in an upright position in the corner of the closet recess. Opposite the opening of the pipe *q*, the cylinder has an internal guide-piece *s*, through which the valve-spindle passes, so as to be accurately guided vertically; and beneath this guide-piece is a second or inverted valve-seat *t*, of larger size than the upper one. A second valve *u*, formed like the upper one, works on the under side of the valve-seat *t*, so as to open downwards. Beneath this lower valve is a second wide branch pipe *v*, passing off to the upper part of the basin, as shewn at *w*, fig. 1. The receiver or air vessel *r*, is perfectly air-tight, and it is of such a form that its lower part *x*, is considerably larger in sectional area than the upper part *y*. When the spindle *i*, of the valve is pushed upwards, by pressure on the seat, the valves occupy the position assigned to them in fig. 2; the upper inlet valve

o, opening to admit water from the supply reservoir to the upper part of the valve-cylinder, and through that cylinder to the vessel *r*, by the large pipe *q*. In this way the lower section *x*, of the vessel *r*, is filled with water under compression, arising from air contained in the upper narrower part *y*. At the same time that this occurs, the lower valve *u*, closes; so that all communication between the valve-cylinder and the basin is for the time being cut off. When the pressure is removed from the seat, the spindle *i*, is permitted to fall; and this action at once closes the upper valve *o*,—shutting off the inlet supply; whilst, at the same time, it opens the lower valve *u*, and allows the water, just supplied to the receiver *r*, to rush down under the pressure of the air in the part *y*, combined with that of the large mass in the lower section *x*, and flow through the lower part of the valve-cylinder, and through the lower wide pipe *v*, to the basin. This action, of course, clears out the basin in the usual way, and brings the valve to its quiescent position. The communicating ways between the receiver *r*, and the water-closet basin, being of much larger capacity than that from the service-pipe, renders the use of wide service-pipes unnecessary, and admits of a better cleansing flush of water down to the basin. When the valve-spindle is down, whilst the water-closet is out of use, the superincumbent pressure of the water from the service-pipe is upon the back of the upper valve *o*, and the tight closing of this valve is thus satisfactorily ensured.

The patentees claim, First,—the general arrangement and construction of water-closets and urinals, as hereinbefore described. Second,—the system or mode of working water-closets and urinals by means of duplex valves, as hereinbefore described. Third,—the application and use, in water-closets and urinals, of a duplex valve, which shall alternately open the water inlet to an air reservoir, and open a passage from such reservoir to the basin. Fourth,—the system or mode of constructing and arranging the receivers or air and water chambers of water-closets and urinals, with upper and lower sections of different capacities.

To WILLIAM WILLIAMS, *of Birmingham, patentee of electric telegraphs, for improvements in electric telegraphs.*—[Sealed 19th November, 1852.]

THIS invention consists in combining line wires with electro-magnets, in such manner that the line wires used are soldered in metallic contact with the coil of wire wrapped round the

iron or other bar forming the electro-magnet; the two line wires being respectively connected to the electro-magnet wire near where it commences to make the coil, and near where it departs after making the coil.

In Plate X., fig. 1, is a side view of a bar of soft iron having three coils of insulated wire thereon; and fig. 2, is a longitudinal section thereof. *a*, is the bar of soft iron, or, it may be, of nickel: on the middle of the portion of the bar, it is wound with insulated wire of comparatively large diameter. Copper wire of No. 12 of the wire gauge, is preferred; and the two ends of this wire are put in metallic connection with the two ends or poles of a battery, when an electric circuit is to be completed in order to convert the bar *a*, into an electro-magnet. *b, b*, are two reels on the ends of the bar *a*, on each of which, fine insulated wire is wound; and it has been found that 3 lbs. of No. 35 wire, to 2 lbs. of the thicker wire, when working with two cells of a Daniell's battery, worked Brett's printing machine between London and Dover. In making up the coils, the two inner ends of the wires of the coils *b, b*, are placed in metallic contact with the thicker wire used for producing the electro-magnet; and the two line wires of the telegraph are to be in metallic contact with the outer ends of the fine wires of the two coils *b, b*; and the two inner ends of the wires composing the coils *b, b*, are soldered, or otherwise put in metallic contact with the wire in the central portion of the bar *a*; the one near where it commences to wind on the bar *a*, and the other near where it departs from the bar *a*, after making the coils round it. And it is the combining of coils, and placing them in metallic contact as herein described, which constitutes the peculiarity of this invention.

To Douglas Hebson, *of Dale-street, Liverpool, for improvements in working the air-pumps of steam-engines.*—[Sealed 13th April, 1853.]

This invention consists in causing the main driving crank of the engine to be made so as to form an excentric, from which motion is conveyed to work the air-pump by connecting the excentric band or hoop to the air-pump rod.

In Plate X., fig. 1, represents a front elevation of the driving crank and crank-pin, with inverted excentric on the same, for working the air-pump. *a, a*, is the centre portion or boss of the main driving crank; *b, b*, the excentric, for working the pumps; *c*, the crank-pin, to which motion is

given by the engine. The excentric, *b, b,* may be made solid or in one piece, either with the crank or crank-pin, or in a separate piece, properly secured to the crank-pin. Fig. 2, is a front elevation of an arrangement for the same purpose, in which the crank itself is made to work as an excentric. *a, b,* is the excentric crank; *c,* the crank-pin; *d, d,* the excentric strap, conveying motion to the air-pump; and *e, e,* the crank shaft.

The patentee claims the arrangements or combinations of parts, herein shewn and described, for giving motion to the air-pumps of steam-engines.

To Thomas Masters, *of Oxford-street, confectioner, for improvements in apparatus for freezing, cooling, and churning.*—[Sealed 4th May, 1853.]

This invention consists in constructing the inner vessel for holding the materials to be frozen, cooled, or churned, in such a manner as to expose a large amount of surface to the freezing mixture or to the liquid employed to facilitate the churning.

In Plate X., fig. 1, is a vertical section of a freezing machine. *a, a,* is an exterior pail, or other suitable non-conducting vessel, for containing the interior parts of the apparatus. This vessel may be made of china, porcelain, or earthenware; in which case it need be of such a thickness that the non-conducting substance can be dispensed with. Inside this vessel is placed a second hollow vessel *b,* for containing water or other liquid to be cooled or frozen, and provided with a tap *c,* which passes through the exterior vessel; by means of which the freezing mixture may be drawn off. In some cases, however, where liquids are not required to be cooled or frozen, the inner vessel is dispensed with. Inside the inner vessel, when employed, or, when the inner vessel is not made use of, inside the outer vessel, is placed the rough ice or freezing mixture, in which is placed a vessel *d,* provided with an inner conical tube *e.* The mixture to be iced is placed in the interior of this freezing vessel *d*: it will be seen that the freezing mixture is brought in contact, not only with the sides, but also with the centre or conical tube, whereby a large amount of surface is exposed thereto; and the cream or other matter placed in the vessel *d,* becomes frozen in a much shorter time than in the icing pails now ordinarily used. *f,* is a spindle, which passes through the centre of the freezing vessel, and is provided with an agitator *g,* for churning or stirring the rough ice or freezing mixture.

The spindle *f*, is provided with a forked spatula *h*, for agitating the cream or composition to be iced. *i*, is a cover to the apparatus, through the centre of which the spindle is passed, which has fitted to it a crank-handle *k*, or other suitable means, for communicating rotary motion to the spatula *h*, and agitator *g*. When the freezing vessel is removed from the pail, the pail or outer vessel forms a wine cooler. Fig. 2, represents a vertical section of a freezing apparatus, similar to the one just hereinbefore described; but in this apparatus the freezing vessel *d*, is so shaped as to form a mould for imparting an ornamental shape to the cream or other composition to be iced. The handle *k*, instead of being placed upon the end of the spindle, is attached to one side of the cover of the freezing vessel. Fig. 3, is another modification of the freezing apparatus, in which the spatula *h*, remains stationary; the requisite rotary motion being imparted to the freezing vessel *d*, by means of the handles *k*, *k*. The agitator *g*, for churning or stirring the rough ice or freezing mixture, may also be formed with teeth upon its edge, similar to a spur wheel; so that in some cases, where it may be desirable to use several of the freezing apparatuses, they may be so arranged that the agitators may gear into one another; whereby the requisite rotary motion will be imparted to the whole, through the motion given to that which has the handle or handles attached to it. Fig. 4, represents a freezing apparatus combined with a wine cooler: the centre conical tube is also only carried partially up in the interior of the freezing vessel *d*. When these apparatuses are employed as a churn, instead of rough ice or a freezing mixture being placed in the outer vessel, warm water is placed therein, and the cream to be churned is placed in the vessel *d*.

The patentee claims the several arrangements and constructions of the inner vessels *d*, of freezing, cooling, and churning machines; whereby a larger amount of surface is exposed to the action of the freezing mixture or other fluids or compounds for performing either of the operations of freezing, cooling, and churning, as hereinbefore described.

To John Hetherington, *of Manchester, machine maker, for improvements in preparing cotton, wool, flax, silk, and other fibrous substances for spinning.*—[Sealed 5th May, 1853.]

This invention refers to such preparing machinery as operates upon the material by pointed instruments, for the purpose of

effecting a process of combing or carding, and consists in causing the material to be received and kept upon and also discharged from such pointed instruments by an artificial current, or by a pressure of air. This principle of operation may be embodied in various arrangements and constructions of machinery, which have for their object the straightening or cleaning of fibrous substances.

In Plate X., fig. 1, is a longitudinal section and fig. 2, a cross section of a machine suitable for combing, and thereby opening out and cleaning the fibres of cotton, either from the tangled mass in which they are imported to this country, or after they have been submitted to the willowing or other such process. In this arrangement of machine there are a series of cylinders 1, 2, 3, 4, provided with points, which are intended successively to receive the material: the cylinders are caused to revolve at various velocities—gradually increasing towards the delivery end of the machine; so that the fibrous material, as it is removed from one by the teeth of another, becomes drawn out and straightened. The method by which the material is transferred from one surface to another and retained thereon, is as follows:—The framework *a*, of the machine carries at its upper part two longitudinal chambers *b*, *c*; the one communicating, by means of a passage *d*, with a fan or blower *e*; the other, through a second passage *f*, with another blower *g*. The passage *d*, enters the blower *e*, at the centre, and will therefore exhaust air from the chamber *b*. The centre of the blower *g*, is in communication with the atmosphere, and will therefore draw air therefrom, and propel it from its circumference along the passage *f*, into the chamber *c*. According to this arrangement, therefore, there are two compartments,—the one from which air is constantly withdrawn, and the other into which it is constantly forced; and the arrangement to be described is for the purpose of bringing suitable parts of the operating teeth alternately into communication with these two compartments; so as first of all to draw the material on to the combing instruments, and subsequently to discharge it therefrom. The cylinders *h*, which carry the combing pointed instruments, are provided with a number of perforations on their peripheries, and are mounted so as to be capable of turning in sockets formed within two series of boxes *i*, *j*,—each one being enclosed by sides so as to form independent chambers, but the whole being in communication by means of orifices *k*, *l*, with the longitudinal chambers *b*, *c*. One end of each cylinder *h*, is provided with a disc *m*, upon which is formed a shaft *n*, for the purpose of carrying the necessary gear; and in these discs are formed

apertures *o, o,* by which a communication may be established with the interior of the boxes *i.* The other ends of the cylinders are left open, as regards their own construction, but are partly closed by the inside of the series of boxes *j,* which communicate by means of apertures *l,* with the longitudinal chamber *c.* As these ends of the cylinders, however, are not entirely closed, a communication between the interior thereof and the boxes *j,* is established by an opening *p.* Within the cylinders *h,* are placed partitions *q,* fitting the interior periphery thereof, and carried at one end by spindles *r,* which are secured to bosses formed on the boxes *j,* by screws *s*: the other ends of the partitions are provided with pins *t,* which project loosely into the bosses of the flanges *m.* By this arrangement the partitions *q,* are held in one position during the revolution of the cylinders, which are therefore constantly divided into two compartments; the lower being in connection with the exhausting chamber *b,* and the upper with the blowing chamber *c.* As the cylinder, however, revolves, it is evident that the orifices *p,* thereof, would arrive at the exhausting side of the partition, and that the operation, therefore, would be reversed; but this is prevented by the lower portion of the area being closed up by the sides of the boxes *j,* as before mentioned. In like manner the apertures *o,* of the exhausting compartment, when they have revolved so as to occupy a position above the partition *q,* will be closed by the sides of the boxes *i,* so that the upper compartment is always submitted to a pressure of air, and the lower to an exhaustion. The main driving-pulley of the machine is shewn at *u,*—communicating motion by means of a pinion *v,* to a toothed wheel *w,* and from thence to the train of wheel-work, shewn in dotted lines: the gearing, however, may be arranged in any convenient manner, so as to cause the cylinders to revolve in the direction of the arrows, and at separate rates, increasing towards the delivery end of the machine. The material is placed upon an apron *x,* which derives a slow travelling motion from suitable gearing: from this it is taken by the dish and roller *y,* usually termed the "patent feeder," and by it presented to the teeth of the first cylinder 1. The lower compartment of this being exhausted through the chambers *b, i,* the material will be drawn on to the teeth by the current of air passing through the perforations of the cylinder, and will by them be carried downward in the direction of the arrow, until it shall have arrived above the partition *q,* at which situation it will be exposed to a current of air propelled through the perforations of the cylinder from the chambers *c, j,* and

upper compartment, so as to be forced across a stationary blade *z*, on to the teeth of the cylinder 2, which, as it revolves in the direction of the arrow, and at a velocity superior to that of the cylinder 1, will effect a combing and cleansing of the fibres. In like manner the material will be transferred from the cylinder 2, to the others of the series; the exhausting of the lower chamber constantly keeping the fibres upon the pointed instruments until they become exposed to the upper or blowing compartments, for the purpose of removal to the succeeding teeth. From the last cylinder 4, the material is expelled by the blast, so as to be received by a pair of rollers *a**, and, subsequently, by the others, *b**, which may deposit it into a can or other receptacle, or cause it to be wound into a lap, again to be fed into a similar machine for another operation of combing, or to be submitted to any other ordinary process of preparation.

The patentee claims the application of an artificial current of air for the purpose of drawing fibrous materials on to pointed instruments which operate upon the fibres, and also for transferring and expelling the same therefrom.

To Robert Anderson Rüst, *of Regent-street, in the county of Middlesex, piano-forte manufacturer, for an improvement in piano-fortes.*—[Sealed 6th July, 1853.]

This invention consists in making perforations in the belly or sounding-board of piano-fortes, through which tubes of metal, bent at their lower ends, are inserted and brought forward, through hollow bars, to the front of the sounding-board. These tubes extend upwards through or into the rest-plank, and terminate in sound-holes or apertures at the top of the instrument. The effect of these tubes will be to add great vibration, depth, and brilliancy of tone to the piano-forte. The sound-holes are provided with dampers, in order to shut off and regulate the sound.

In Plate IX., fig. 1, represents a view of a sounding-board, fitted with this improvement; fig. 2, is a section of the same; and figs. 3, and 4, are separate views of the tubes. *a*, *a*, is the sounding-board; *b*, *b*, the wires; and *c*, *c*, are the tubes,—the lower or bent ends of which are passed through the holes *d*, *d*, in front of the sounding-board. These tubes are carried up through the rest-plank *e*, and open into the holes *f*, *f*, which may be covered with dampers, if required, to regulate the sound. In some cases, instead of

bending the lower ends of the tubes, straight taper tubes are inserted in the hollow bars at the back of the sounding-board, communicating with the holes *f*, *f*, in the rest-plank, and carried down to a point immediately above the front sound-holes. When desired, the apertures are formed in the bend of the tubes, as shewn at *g*, fig. 4, when such tubes are inserted in the hollow bars; whereby the sound is also communicated to the bars, and thereby increased.

The patentee claims the several methods of inserting tubes through perforations in the belly or sounding-boards of piano-fortes, in the manner and for the purpose hereinbefore described.

To WILLIAM JOHNSON, *of Lincoln's-inn-fields, civil engineer, for improvements in the treatment or manufacture of caoutchouc,—being a communication.*—[Sealed 24th February, 1853.]

THIS invention relates, in the first place, to the treatment of the raw juice of the caoutchouc tree in such manner that the juice shall remain in a fluid state without deterioration; and, secondly, to the after treatment of such fluid matter for the production of a new article, or raw material of manufacture. Shortly after the milk or juice is collected, it is strained, and has then added to it a quantity of the concentrated liquor of ammonia, or other ammoniacal matter, or any combination of nitrogen and carbon. The mixture is then well mixed, when it will remain in a white fluid state, capable of transportation and use as a preserved material, if kept in air-tight receptacles. For the production of a new article of manufacture from this composition, it is run out on a suitable surface, and submitted to slow evaporation. This gradually solidifies the layer so poured out, and the mass becomes a new article of manufacture,—very elastic, and tough, and transparent, and suitable for all the ordinary uses of caoutchouc, as well as many others not yet in existence.

In carrying out these improvements, milk or juice of the caoutchouc or India-rubber tree is collected by tapping the trees in the ordinary manner,—the liquid so obtained being permitted to flow into suitable vessels of clay or other material. When the liquid is collected, and before it has time to sour from atmospheric exposure—that is to say, within about three hours from the time that the liquid is produced—it is strained through a clean cloth, or filtering fabric or strainer, into a clean tin or glass vessel. When this is done, concentrated

liquor of ammonia, or ammonia in any other form, or compounded to produce a like result, or any combination or compound of nitrogen and carbon, is added to the liquid or juice, in the proportion of about one fluid ounce of the liquor of ammonia to every pound weight of the juice. In this mixture it is preferred that the concentrated liquor of ammonia should be the added ingredient, and that the proportions should be those before stated; but these proportions are variable within reasonable limits After this admixture the composition is thoroughly mixed up, so as to be perfectly incorporated. The composition so produced is still a liquid under exposure to the atmosphere; and its color remains equally as white as when drawn from the tree. In this state it may then be put up in air-tight cases or vessels for transportation or after use,—tin cases or glass bottles being used, by preference, for this purpose. When thus treated and packed, the mixture may be preserved for any reasonable length of time, and it may be conveyed to any part of the world, whilst it still retains its liquid state and pure white color suitable for manufacturing purposes, and, in many respects, far superior to the smoked or common India-rubber of commerce.

For the production of a new and original article of manufacture from this substance, it is poured or run on to plates of glass, or polished metal, or glazed paper, or other suitable receiving surface of the desired size and form. In this condition it is subjected to slow atmospheric evaporation, either in the open air, or at the ordinary atmospheric temperature, or at a temperature of from 75° to 100° Fahr. By this treatment the liquid portion of the spread-out mass is dissipated, leaving behind it a solid mass, very elastic and tough, and comparatively transparent or translucent, and possessing properties distinct from all other known substances. Such manufactured substance is of great utility, and may be used as the material for, or be employed in the manufacture or production of, a great variety of articles, embracing those for which previously-known caoutchouc compounds have been used, together with many others for which the material has not hitherto been used.

The patentee claims, First,—the system or mode of treating or manufacturing the milk or juice of the caoutchouc or India-rubber tree as hereinbefore described. Secondly,—the application or use, in combination with caoutchouc-milk or juice, of the concentrated liquor of ammonia or ammoniacal matter in any other form, or any combination of nitrogen and carbon.

To CHARLES GOODYEAR, *of St. John's Wood, for improvements in combining India-rubber with certain metals.*—[Sealed 4th May, 1853.]

THIS invention has for its object the manufacture of articles of a hard compound, made of India-rubber and sulphur (with or without other matters), subjected to heat. The invention consists in combining with such hard compound, in the manufacture of articles therefrom, thin surfaces of gold, silver, or other metal exterior to, or interior of, the article of the hard compound. The gold or silver is, by preference, to be shaped in dies or moulds, and the prepared India-rubber is then to be introduced into such dies or moulds, and thereby moulded in contact with the gold, silver, or other metal; and, in the moulded state, the articles are to be subjected to heat, in order to produce the hardening effect to the India-rubber compound.

The forms of the articles which may be manufactured are said to be very various; and each article may be coated either wholly or partially with metal. It is stated, that the object of the invention is to obtain the light, strong, and tough properties of the hardened compounds of India-rubber with the ornamental and other properties of metal, combined in the making of one article. Thus, supposing it be desired to ornament or coat, or partly coat, a cup or vessel with an exterior coating of open-gold work, the manner in which this description of work is accomplished is to take thin sheet-metal, and to cut therefrom the device required, and then, by stamping or otherwise, to make it of such form as to fit the mould in which the cup or vessel, the compound of India-rubber, is to be formed; and, having introduced the metal, whether composed of one or more pieces, the plastic compound of India-rubber is to be introduced and pressed into form in the mould, by which the metal will become imbedded, or partially imbedded, in the plastic compound. It is not, however, necessary that the metal coating should be perforated, as it may be embossed or otherwise; but it is desirable that it should have projections or indentations where it comes in contact with the plastic compound of India-rubber, as, by such means, the combination of the metal with the India-rubber compound is better insured: or the parts of articles, which are of metal, may be made up of wire-work, or cast, or otherwise formed. When the metal is to be inside the article of India-rubber compound, the parts in metal are to be first shaped, and then the India-rubber compound is to be shaped or pressed into

form in the mould: the lining or part lining of metal is to be introduced, and to be pressed therein, and it is to be retained therein by the convex portion of the mould. Although, generally, sheet metal is preferred for these purposes, the metal parts may be cast or otherwise formed or shaped, and similarly applied in the act of moulding the article of India-rubber compound. When the metal is to be applied outside of articles made solid with the India-rubber compound, such as the metal ends of knife-handles and others, the metal, made into the desired form and hollow, is to be introduced into the mould, and the India-rubber compound is to be pressed into the mould,—care being taken, in all cases, that the parts of the article which are composed of metal are made with such roughnesses, or projections, or indentations, that, when the India-rubber compound is pressed thereto, and rendered hard by heat, the metal will not separate from the hard compound of India-rubber. By these means articles, of a great variety of kinds, may be manufactured, composed partly of hard India-rubber compound, and partly of metal; and the parts of metal may be either made from sheet metal or wire, or castings, or otherwise. The patentee states that, where the metal to be used is acted on prejudicially by sulphur, he causes the surfaces of metal which are to come in contact with the India-rubber compound, to be tinned, or else coated with India-rubber cement, or other varnish that does not contain sulphur, before combining them with the India-rubber compound. He also remarks, that it will be desirable, in all cases where the articles admit of it, to retain the article in the mould in which it is shaped during the time that it is subjected to heat. The compound of India-rubber preferred is two-thirds of India-rubber and one-third of sulphur, by weight. Other matters, such as coloring matters, may be applied as heretofore, and the heat is to be gradually applied as follows:—The heat is raised slowly, for about half an hour, up to 230° of Fahr., and retained at that temperature for about two hours; it is then raised gradually, during the remainder of the six hours, up to 295° to 305° Fahr.: the lower of these two temperatures appears to produce the more tough or horny character, and the latter the character of whalebone.

The patentee claims the mode of combining India-rubber with certain metals, in the manufacture of articles, by moulding the compound of India-rubber, and producing the hardening change thereto by heat, when in contact and combination with the metal.

To Christopher Nickels, *of York-road, Lambeth, for improvements in machinery for masticating, kneading, or grinding India-rubber, gutta-percha, and other matters.*—[Sealed 6th May, 1853.]

It has heretofore been the practice, when pairs of rollers with indentations, teeth, or grooved surfaces, have been used for masticating, grinding, or kneading gutta-percha, &c., to cause the teeth, projections, grooves, and indentations to work into each other. Now this invention consists in arranging cylindrical or conical rollers, having projections, teeth, indentations, or grooves, so as to work without the teeth or projections, grooves, and indentations entering into each other; and the forms of the projections, teeth, grooves, and indentations, may, for this purpose, be varied, and the rollers may work at a like or different speed.

In Plate X., fig. 1, is an end view, and fig. 2, a transverse section of a machine, constructed according to this invention. *a, a*, is the framing, and *b*, is a trough, within which the rollers *c, c*, work. The trough *b*, may, when desired, have a steam-jacket, if the matters (or any of them) which are being acted on require a greater heat than is consequent on the process itself. In kneading or treating gutta-percha, it is desirable to allow steam to flow into the trough for a short time, after the machine has been standing still; but, when the machine is continued in work, the heat resulting from the process is found sufficient for gutta-percha and India-rubber, and for compounds or mixtures containing those matters. The axles of the rollers *c, c*, turn in suitable bearings c^1, c^1, and are geared together by the cog-wheels *d, d*. The rollers *c, c*, may be of like or different diameters, and, consequently, move at a like or different surface speed. It is not essential that the rollers should be cylindrical, for they may be conical; and, in that case, it is preferred that the smaller end of one should come to and work with the larger end of the other. In fig. 2, each of the rollers are shewn as cut with angular grooves or projecting parallel ribs, which correspond in regard to the two rollers shewn; but this is not necessary, as the projecting teeth of one, and those of the other, may differ in form. And although the forms shewn are preferred, by reason of the simplicity of their structure, yet the form of the teeth or projections, and of the hollows, may be varied infinitely, without appearing to produce a materially different effect; and the next most simple form of rollers, with teeth or projections, are parallel rings

or rows of pyramidal teeth on cylinders,—such as would be produced by turning angular parallel grooves around those shewn in fig. 2.

The rollers work parallel, and nearly up to each other, as is shewn. Motion is communicated to the rollers *c*, *c*, by a steam-engine, or other prime mover, applied to the axle c^3, of one of the rollers *c*. In order to prevent the matters which are being operated upon from passing over on the sides of the trough, the guard-rails *e*, *e*, are employed, which, when necessary, can be fastened by the catches *f*, *f*, over the sides of the trough.

The patentee remarks, that these machines are suitable for masticating, kneading, or grinding India-rubber, gutta-percha, or other matters, when in a plastic state, and where the matters require to be moved through and through the machine, by the action of the masticating or kneading-rollers, till the desired extent of masticating, kneading, or grinding, is accomplished.

The patentee claims the combination of apparatus herein described, whereby two rollers, with teeth or projections, work at a distance from each other, as described; and although they may have teeth and recesses which would, if brought near enough, interlock and work as the teeth of wheels, yet the peculiarity is in arranging the working that the teeth shall not work between or into each other.

To SAMUEL ALFRED CARPENTER, *of Birmingham, manufacturer, for a new or improved elastic webbing or fabric.*—[Sealed 23rd May, 1853.]

THE object of this invention is the production of elastic webbings or fabrics in which the degree of elasticity may be made to vary between that of fabrics made of threads of vulcanized caoutchouc, and that of fabrics made of threads of ordinary or unvulcanized caoutchouc.

This invention consists in introducing into elastic webbings and fabrics a mixture of threads of ordinary caoutchouc and threads of vulcanized caoutchouc,—the said threads being worked together in any desired relative quantities and in any convenient manner. Alternate threads of vulcanized and unvulcanized caoutchouc are ordinarily used, but the proportion is varied as greater or less elasticity is required. The elasticity is also modified by altering the weights used upon the warps of caoutchouc or cotton in the process of weaving.

The patentee claims making elastic webbing or fabric by introducing into the said fabric a mixture, in any proportion or in any way, of threads of vulcanized and unvulcanized caoutchouc.

To Frederick Ayckbourn, *of Guildford-street, Russell-square, patent folding boat manufacturer, for improvements in the manufacture of waterproof fabrics.*—[Sealed 22nd June, 1853.]

This invention consists in rendering woven, felted, looped, and other similar fabrics, and paper, and also leather, waterproof, by coating, covering, or preparing the same with a solution or preparation of India-rubber, or with "chouca," marine glue, or other suitable cement, and then facing the surface of such coating, covering, or preparation, with gutta-percha, in the form of a paste, or in solution, or in a plastic state.

In carrying out his invention the patentee takes a piece of woven, felted, or looped cloth or other fabric, or a piece of paper, or leather, and coats or covers the same in the manner described in the specification of a patent granted to him the 22nd December, 1852, or by any other ordinary well-known processes, with India-rubber solution, or with chouca, marine glue, or other cement, in suitable quantity or proportion, according to the nature of the fabric employed, and in one or more coats or separate applications, according to the nature and purpose of the material to be waterproofed. Between each coat or application he drives off the volatile spirit contained in the solution or cement, by heat, or allows it to evaporate by exposure to the air, in the ordinary manner. He then faces the surface of the coating, covering, or preparation, so firstly formed or applied (in one or more layers) by or with the gutta-percha (in the form of a paste or solution, or in a plastic state), and heated to the requisite temperature for freely working the same (such paste or solution being also applied in one or more layers) by the ordinary process or processes, or any of them, as has been already described for the said firstly-formed or applied coating, covering, or preparation; and thus he forms or applies a second coating, covering, or preparation, in one or more layers outside of, and upon the surface of the first.

Both sides of the fabric or material may be similarly treated; in which case the process or processes are completed on one side first, and afterwards on the other.

To JOHN PYM, *of Pimlico, Gent., for improvements in the permanent way of railways.*—[Sealed 29th March, 1853.]

THIS invention consists in constructing sleepers (which are transverse sleepers) of earthenware, slate, stone, or other suitable materials; and of whatever material they may be made, they are formed hollow, instead of solid as heretofore. In order to prevent what is termed sopping, the patentee perforates the bottom or sides, to allow the water to enter the interior chamber thereof, and to run off at either end. To fix the chairs upon the sleepers, where not desirable or practicable to adopt the methods now in use, the sole of the chair is formed sufficiently long to overlap the sides or edges of the sleeper; and the ends of the sole are secured by passing a bolt from side to side, through the sleeper, and fastening the same by a nut, pin, or rivet.

To prevent the jarring of the chair and sleeper, wood, felt, or other suitable material, is placed between the chair and the sleeper.

The patentee claims, First,—the construction of hollow perforated sleepers as hereinbefore described. Second,—the construction of sleepers of slate and earthenware. Third,—the construction of chairs, and mode of fastening the same as hereinbefore described.

To NATHANIEL CLAYTON *and* JOSEPH SHUTTLEWORTH, *of the Stamp End Iron Works, Lincoln, agricultural engineers, for an improvement in portable and locomotive steam-engines.*—[Sealed 13th April, 1853.]

THIS improvement consists in placing the working cylinder or cylinders of portable and locomotive steam-engines in a steam-chamber or jacket within the smoke-box, whereby condensation of steam within the cylinder, and radiation of heat therefrom, is effectually prevented.

The form of the steam-chamber or jacket, its position within the smoke-box, and the communication between the steam-chamber and the boiler, may be so disposed and varied, as to suit the particular construction of the engine, and the purpose for which it is to be used,—the best arrangements of which will occur to any intelligent workman. The patentees remark, that they are aware that the working cylinders of steam-engines have been heretofore surrounded by a steam-chamber or jacket, and also that the working cylinders of locomotive and portable steam-engines have been sometimes

placed within the smoke-box; but they have found considerable advantage to arise from surrounding the working cylinder with a steam-chamber,—such steam-chamber being placed within the smoke-box of the engine.

The patentees claim the combination of surrounding the working cylinder or cylinders of portable and locomotive steam-engines with a steam-chamber or jacket, placed within the smoke-box of the engine.

To OCTAVIUS HENRY SMITH, *of Bedford-square, and* YOUNGS PARFREY, *of Pimlico, for improvements in the manufacture of carriage-wheels.*—[Sealed 10th May, 1853.]

THIS invention consists in casting parts of the naves of carriage-wheels of metal in such manner that each nave has sockets or openings to receive the spokes, and the centre of the cast part is hollow to receive wood or soft material. The box for the axle-tree is fixed in the soft material, and the ends of the spokes rest upon the soft material so introduced into the nave.

In Plate IX., fig. 1, shews a plan or external view of a nave constructed according to this invention; fig. 2, is a vertical section, taken at the line A, B, of fig. 1,—parts of the spokes being also shewn in their sockets; fig. 3, is a longitudinal section through the line C, D, in fig. 1; and fig. 4, is a plan of the wood or soft material which is introduced into the hollow of the cast part of the nave. *e*, is the cast-metal portion of the nave of a wheel,—the contour of which may be varied. e^1, e^1, are sockets for receiving the spokes *f, f*. The interior of the casting *e*, is hollow, and receives the filling of wood *g*, or, it might be, of other soft material. The wood is formed with a groove g^1, of a width suitable for receiving the ends of the spokes, as is shewn; and thus the ends of the spokes come against the soft material *g*. The outer ends of this part *g*, of the nave of a wheel, is bound with hoops *h, h*; and the box *i*, for the axle, is let into and fixed in the part *g*, of the nave, in like manner to what like boxes have been heretofore fixed in naves of wheels made of wood.

The patentees remark, that although they believe wood to be the best material for the part *g*, of the nave of a wheel, other soft material, such as gutta-percha combined with sawdust, may be used in place thereof.

They claim the construction of naves of wheels herein described.

To John Drumgoole Brady, *of Cambridge-terrace, Esq., for improvements in knapsacks.*—[Sealed 14th May, 1853.]

This invention consists in a mode or modes of constructing knapsacks, whereby they are rendered lighter, are made to fit the back more easily than heretofore, and are slung or suspended in such manner that they may be carried with increased comfort, without in any way impeding or interfering with the free movements of the wearer; and whereby they are also made perfectly waterproof.

In Plate X., fig. 1, represents a front view of a knapsack, constructed according to this invention, closed and ready for use; fig. 2, is an end view of the same; and fig. 3, a view of the knapsack, open, for the purpose of shewing more distinctly the different parts of which it is composed. *a, a,* is the body or case of the knapsack, which is made gradually tapering, or narrowing in form, both in depth and breadth, from the top towards the bottom, as shewn in figs. 1, and 2. The body or frame thereof is composed of gutta-percha, or compounds thereof, or of papier-maché, or straw-board, moulded into the precise shape required; or it may be made of wood, or of a combination of wood and straw-board or papier-maché: and when thus made of other materials than gutta-percha, or compounds thereof, it is covered with undressed skin or leather, or vulcanized India-rubber cloth, or American cloth, or painted canvas, or other suitable waterproof material, so as to make a knapsack both light and waterproof. *b,* is a flap, which is capable of being raised, so as to admit of the articles required to be carried being placed in the case *a,* of the knapsack. This flap is fastened down by the tabs *a*, a*,* which are passed over the studs *b*, b*.* The flap is composed of any suitable waterproof material, and may or may not form a part of the same piece which covers the case. *c, c,* are leather straps, by which the knapsack is slung; these straps are entirely unconnected with the knapsack, and may be altogether detached from it. *c*, c*,* are double buckles, which are fitted to the straps *c, c,* when required, for carrying the great coat without the knapsack. The straps *c, c,* are passed round the back of the pack, over the studs at the bottom, then through the two links at the top of the pack, and then brought up in front, where they are connected by the buckles *d*, d*,* through which the shoulder-straps *d, d,* or slinging parts of the straps *c, c,* are passed. The great coat, when carried, is to be placed under those straps, and between the two links at top. c^1, is a cross strap, which connects the ends of the straps *c, c.* *e*,*

is a fixed buckle at one side; and e^1, another buckle or hook at the other side, attached to the bottom of the pack *a*; by means of which the straps *d, d*, are secured, after passing over the shoulders, and may be adjusted to the ease of the wearer. *e*, is a pocket, which is inside of, and attached to one of the outer flaps *f, f*, and is folded over and secured in its position by means of the outer flaps *f, f*, lacing over it, as shewn at *g, g*. This pocket is intended to contain a shirt, socks, or other portions of the soldier's necessaries, and is to be distended so as to suit the conformation of the wearer's back, and keep the knapsack in a perpendicular position; or the pocket may be attached to one side without the flaps *f, f*, and made fast at the other side, by means of straps and buttons, or other fastenings. The mode of slinging the knapsack by means of straps, unconnected with and detached from it, may also be adopted with knapsacks of a different form and construction from that shewn.

The patentee claims the constructing of knapsacks as hereinbefore described, as also the mode of slinging the same; whereby they are rendered lighter or more easy to carry, are made to fit the back more comfortably, and are at the same time waterproof.

To THOMAS JAMES PERRY, *of the Lozells, in the parish of Aston, near Birmingham, engine-turner, for an improvement or improvements in raising and lowering Venetian and other blinds; applicable also to the raising and lowering of other bodies.*—[Sealed 13th June, 1853.]

THIS invention consists of an instrument or apparatus for raising and lowering blinds, and such bodies as are raised and lowered by the winding and unwinding of a cord; which instrument or apparatus fixes the position of the blind or other article, after it has been raised or lowered, so as to prevent the further raising or lowering of the same, excepting by the application of the hand to the instrument or apparatus.

In Plate X., fig. 1, represents a front view of a blind-pulley; fig. 2, is a side view; and fig. 3, a vertical section of the same. *a*, is a drum or axis, on which the cord *b*, is wound or unwound,—such cord *b*, being connected, in the ordinary manner, with a Venetian or other blind, or other article to be raised or lowered. The cord *b*, is connected with the drum or axis *a*, by being passed through the hole *c*, and its end tied in a knot. *d*, is a crank or lever, attached to the drum or axis *a*, by a joint *e*: the end *f*, of the crank or

lever *d*, is urged, in the direction indicated by the arrow *g*, fig. 3, by the spring *h*; and the pin *i*, in the end *f*, of the crank or lever *d*, is thereby made to engage in one of the holes *k*, *k*, which are formed, at short intervals, around the plate *l*. When the hand takes hold of the knob *m*, for the purpose of turning the crank or lever *d*, the knob *m*, is pressed in the direction indicated by the arrow *n*, and the pin *i*, disengaged from the holes *k*, in the plate *l*. (The pressure on the knob *m*, in the direction indicated by the arrow *n*, is usually effected involuntarily.) The crank or lever *d*, may now be turned in either direction, so as to wind or unwind the cord *b*; and when the blind or other article has been raised or lowered to the required extent, and the hand removed from the knob *m*, the pin *i*, is immediately pressed against the plate *l*, by the spring *h*, and made to engage in one of the holes *k*, in the plate *l*. The crank or lever *d*, is thus fixed in the position, or thereabouts, in which it was left when the hand was removed therefrom.

A modification of this invention is shewn at fig. 4, in which the axis is divided into two parts by a plate or plates *o*, so as to make two drums, on which the ends of the cords p, p^1, are coiled,—such ends being coiled in opposite directions. By turning the crank or lever *q*, the cord *p*, is wound on one drum, and the cord p^1, unwound from the other, or the reverse.

The patentee claims constructing an instrument or apparatus for raising and lowering Venetian and other blinds, and such other bodies as are or may be raised and lowered by the winding and unwinding of a cord, by connecting the crank-lever or handle, by which the said cord is wound and unwound, with the axis or drum on which the said cord is wound and unwound, by means of a joint, and causing the said crank-lever or handle to engage or lock itself, and thereby fix the position of the drum or axis when the pressure of the hand is removed therefrom, as hereinbefore described.

To William Little, *of the Strand, for improvements in the manufacture of lubricating matters.*—[Sealed 14th July, 1853.]

This invention consists in combining soap with products obtained by distilling tar, resulting from the distillation of coal and bituminous matters, and wood or other vegetable matters.

The products of the distillation of coal-tar, resulting from the single distillation of bituminous coal, or substances of like

nature, are pitch, coal-oil, and naphtha. The lighter product, or that which first distils over, is the naphtha, or "coal-naphtha,"—the heavier oil being known in commerce under the name of "coal-oil." Now this invention consists in combining the heavier oily product of the second distillation of coal, or any other bituminous or vegetable substance that produces an oil essentially like the coal-oil, with a saponified animal or vegetable, or fish-oil, or fat, for the purpose of making the compound a good and cheap lubricator for machinery.

The crude oil or tar resulting from the first distillation is subjected to re-distillation in an iron or copper still; and, after setting aside the early products, which consist of a thin spirit or oil, the patentee takes the remainder, which is more or less greasy to the touch, and combines this greasy oil, in various proportions, with soapy compounds of animal, fish, or vegetable oils or fats, with soda or potash; and employs these soapy compounds for combining with the greasy oil, either together or separately, and then proceeds as follows:—To 100 parts of tallow, melted in a cauldron, are added 235 parts of a solution of caustic soda in water, making such solution equal in strength to 10° or 11° Beaumé. This mixture is boiled until saponification takes place, when 90 parts more of water are added, and the whole is again boiled, until the ingredients are thoroughly combined. This constitutes a soda soapy compound. To this is added a potash soapy compound, thus prepared:—70 parts of a solution of caustic potash, equal to 8° or 10° Beaumé, are boiled with 30 lbs. of a fish or vegetable oil, either whale oil or linseed oil, until saponified.

The two soapy compounds being thoroughly mixed by boiling, are poured into a vessel containing 150 parts of the greasy oil, distilled from the crude oil of coal, and the whole is then mixed together, by stirring, until it begins to acquire a thick consistence by cooling, when it may be allowed to remain.

The foregoing is the mode of making a solid grease, suitable for the journals of railway carriages, or various other mechanism.

A liquid grease, for ordinary machinery, is prepared by altering the proportions, thus:—Two parts of the greasy coal-oil are mixed with one part of a soapy compound, prepared by taking one part of the combined soapy compounds, employed for making the solid grease, and adding eight parts of water.

The patentee remarks, that he is aware that an animal or vegetable oil or fat, caustic alkali, and water, have been before

used, in combination with mercury or mercurial amalgam, plumbago, and lamp-black, for the purpose of making a lubricating composition: he is aware that tallow, oil, rosin, and spirits of turpentine, have been employed together to constitute a lubricator; also that a lubricating oil has been produced from the distillations of rosin. He is also aware that the heavy oils, resulting from the distillation of bituminous substances, have been used alone, or mixed with fatty or oily bodies, for the purpose of lubricating machinery; but experience has proved, that in either of these states the heavy oil separates from, and cannot be made to adhere to, the frictional surfaces of the machinery, which thus become bare, and exposed to the oxidating influence of the atmosphere. Now, the peculiar feature of this invention consists in combining the heavy oils, obtained from the distillation of coal and other bituminous substances, with saponaceous compounds, such as those previously described; by which the oil is kept in contact with those parts of the machinery most exposed to attrition, so as not only to prevent access of air to the metallic surface, but to diminish friction, and thereby avoid any undue evolution of caloric.

Another advantage and great peculiarity in the combination of these bituminous oils with saponaceous compounds is, that, at a temperature of about 60° or 70° Fahr., the bituminous oil makes a perfect combination with the soapy matters, quite liquid, and fit for lubricating; whilst, without the combination with bituminous oil, the soapy matter, at this temperature, would be comparatively solid, and totally unfit as a lubricating agent. This quality of rendering soapy compounds liquid, at low temperatures, forms an important characteristic in these oils, rendering them peculiarly valuable as lubricating agents, when in combination with saponified fats or oils.

The patentee claims the combination of the coal-oil, or heavier oily product resulting from the second distillation of bituminous coal (or a matter that will so produce a like oil) with a saponified vegetable, animal, or fish-oil or fat; and whether the coal-oil be combined with the vegetable, animal, or fish-oil or fat, after or during the saponifying process,—the said composition being intended as a lubricator for machinery.

To WARREN DE LA RUE, *of Bunhill-row, for means of treating and preparing certain tar or naphtha, and applying products thereof.*—[Sealed 25th July, 1853.]

IT is well known that the native petroleum naphthas or tars are composed of various fluid and solid hydro-carbons, which

boil at varying temperatures, and can therefore be separated by processes of distillation; and the object of this invention is to effect the separation economically, so as to render these products available for useful purposes,—such as varnish-making, combustion and illumination, lubrication of machinery or wheel-work, and the solid product for the manufacture of candles, and other uses.

The means pursued by the patentee are, first, in order to prevent the loss, as much as possible, of the more volatile constituents of the native petroleum (which, in the case of Rangoon tar, is found to occur when it is imported in wooden barrels), it is at once placed in metallic casks or tanks, having an aperture of convenient size for the introduction of the liquid or pasty material, as the case may be, and which aperture is to be closed hermetically, as soon as possible; as a precaution, it is preferred to have a tin plate soldered over the opening.

In order to exclude the solid constituent, as much as possible, from the first products of distillation, and also to prevent the natural tar being altered by the long continuance of a high temperature, its partial distillation is effected by blowing low-pressure steam through it. To effect this, the petroleum is introduced into a metallic or other still, which is connected with a refrigerator, cooled by a continuous current of cold water. This still should be capable of holding twice the bulk of the tar employed; but its form is not material,—a plain cylinder answering as well as any other; nor is it essential that it should be heated externally. To prevent loss of steam, it is however desirable to surround the still with a wooden or other non-conducting casing. A steam-pipe, connected with a boiler producing steam of sufficient pressure to overcome the weight of the column of petroleum through which it has to pass, enters the still through a steam-tight joint, and proceeds to within an inch or two of the bottom of the still: here the open end of the steam-pipe either terminates or ends in a perforated coil-pipe, supported parallel with the bottom of the still. The still is provided with several gauge-cocks, for the purpose of ascertaining the height of the fluid, from time to time, as it increases with the gradual condensation of a part of the steam; and it should also be provided with a draw-off cock or valve for the abstraction of this condensed water: this must not be allowed to run to waste, until the small quantity of petroleum which comes away with it, frequently as a fine powder diffused through it, has risen to the top. The first action of the steam is the heating of the fluid, which gives off vapors of volatile hydro-carbons before the tar has attained the temperature of 212° Fahr., so that the first distillate contains

little or no water; but this gradually increases in quantity,—the steam serving as a vehicle for conveying the oily vapor to the refrigerator, until at last the oil comes over very slowly. It is better to stop this first part of the distillation so soon as the oils have diminished to one-sixth part of the distillate which runs into the receiver. As the oils which distil over are lighter than water, the distillate is allowed to flow into a separating vessel, which allows of the water running from the bottom, thence into a second, and third, so as to prevent loss of the oily products. These oils are collected fractionally, or according to their respective volatility,—the operator judging of this by the speed at which the distillation takes place under like circumstances: the first portions are nearly colorless when the operation is conducted carefully.

In order to purify the various distillates, thus obtained, they are subjected, two or more times, to fractional distillation with the aid of steam,—collecting the distillate of each distillation in separate portions, which are each distilled separately, and the products collected fractionally. The last distillates, thus obtained, should have their respective boiling limits ascertained; and those of like boiling points may now be mixed together.

The residue of the petroleum, after having been subjected to the action of low-pressure steam, is transferred into an iron still, set in brickwork, which should cover the still up to the point of juncture with the refrigerator. The still is heated by means of an ordinary furnace, and is furnished also with a steam-pipe, which passes into it, and proceeds to within a few inches of the bottom. This steam-pipe is in connection with a coil of pipes heated in a furnace, and communicating with a steam-boiler producing steam of sufficient pressure to overcome that of the column of fluid in the still. The still and coil of pipes, towards the last part of the operation, will have to be heated to between 600° and 700° Fahr.; but the distillation is conducted at as low a temperature as possible, commencing at about 230° Fahr., and the heat of the coil of pipes and the still only gradually increased as may be found necessary. By means of the supersaturated steam, that is, steam heated (by means of the coil of pipes passing through the furnace) above the temperature it would acquire in contact with the water in the boiler, the distillation of the naphtha is effected at a much lower temperature, and with less decomposition than could be done if distilled without the aid of the supersaturated steam. The same result, namely,—subjecting the tar to the action of supersaturated steam,—would be obtained

by either heating the boiler of the still only, or only the coil of pipes; but the arrangement described is preferable. The vapors which distil over are first made to pass into a refrigerator cooled by the surrounding air, and in which the chief products condensed are oils; and, lastly, into a refrigerator cooled by a current of cold water, in which some oil and all the water is condensed, which are separated by a suitable apparatus.

Most of the products of this second part of the operation, which are collected fractionally, contain a solid crystallizable hydro-carbon, which crystallizes from them, particularly in cold weather, and may be separated by filtration. The more volatile products, however, contain little or no solid hydro-carbon.

The various products obtained by the use of supersaturated steam are first separately re-distilled, by means of steam, at or about 212°, which will carry over, from the first portions especially, a large portion of oil, and then finally by means of supersaturated steam. By careful rectification in this way the chief part of the solid hydro-carbon is retained in the still, and comes over with the last products, and may be separated by filtration. The solid substance thus obtained is first subjected to cold pressure, and then to hot pressure, between layers of horse-hair cloth, as is practised with the fatty acids used in candle-making; then heated to 212° Fahr., with a fourth of its weight of oil of vitriol: it is now washed with water, then with alkali, and again distilled and pressed. Thus purified, it is white and diaphanous, and is fit for the manufacture of candles, or as an unguent to replace tallow in lubricating.

The principal part of the oils are obtained colorless, except the latter products, which have a pale yellow tint. As some of the oils obtained have very high boiling points, they cannot, on this account, be burned without a wick, but are very valuable for the fuel of such lamps as are used for camphine; and their difficult ignitibility prevents the danger, in use, which attends such inflammable compounds as turpentine or camphine. From the high boiling point and consequent fixity of these products, they are extremely valuable as lubricators of machinery.

When the object is not to prevent the partial decomposition of the solid hydro-carbon, instead of proceeding as above described, the residue of the naphtha, after partial distillation, by means of low-pressure steam, is sometimes placed in a shallow still, heated by means of a naked fire, which should play as much over the still as possible. This still must be furnished with an alembic head, and protected by brickwork up to the point where it enters this head. This arrangement is neces-

sary on account of the facility with which the distillate condenses and runs back again into the still, but the gutter-channel within the alembic head prevents this,—the condensed fluid flowing into the neck and thence to the refrigerator. To effect the entire distillation by this apparatus, it has at last to be raised to a temperature approaching a red heat, and there is left a small residue of carbonaceous matter. In this mode of procedure some of the solid hydro-carbon becomes converted into oily fluids of very high boiling points. All the products obtained by distillation with a naked fire are subsequently purified by distillation with the aid of steam, as previously described.

By proceeding as before described, a series of oils are obtained which have boiling points progressively rising from a temperature below 200° to above 600° Fahr., and even approaching a low red heat. The complete separation of the constituent hydro-carbons or oils is attended with much difficulty, as one volatilizes in the vapor of the other; and for commercial purposes it is not necessary to effect a perfect separation. By distilling with the aid of a thermometer, and stopping the distillation at certain points, a further purification is sometimes effected; and by agitating the more volatile oils with a fourth part of their weight of oil of vitriol, and then washing, first with water, and afterwards with an alkaline solution, a still further purification is obtained on re-distillation.

The patentee claims the preparation of various solid and fluid hydro-carbons from Burmese or other natural naphtha, petroleum, or tars, in the manner described; and their application, when so prepared, to the purposes of illumination, manufactures, and lubrication; also for the employment of low-pressure steam, and afterwards supersaturated steam, to the distillation of similar native compounds.

To Richard Johnson, *of Manchester, wire-drawer, for improvements in machinery or apparatus for drawing wire.* [Sealed 23rd April, 1853.]

These improvements relate to a method of drawing that portion of the wire through the dies which is required for attachment to the drum upon which it is to be wound; and consist in the application of a second drum, situate horizontally upon the bench. This drum is provided with a chain and clamp for grasping the end of the wire, and has rotary motion communicated to it at pleasure, by means of suitable gearing, and at a slower rate than that of the usual winding-on drum.

In Plate X., fig. 1, is a partial side view of a drawing bench; and fig. 2, is a vertical section of the same. The usual winding-on drum is shewn at *a*, mounted upon a shaft *b*, which is caused to revolve by the shaft *c*. Upon the shaft *b*, is mounted loosely the drum *d*, which is provided with internal teeth, and rests upon the brass *e*, of the shaft *b*, and upon which it may therefore revolve, independently of the drum *a*. Upon the shaft *b*, is also mounted, loosely, a pinion *f*, running upon a collar *g*, upon which it is supported: this pinion is placed in gear with another pinion *h*, affixed to a shaft *i*, which, through the intervention of pinions *j*, and *k*, drives the drum *d*, by means of its internal teeth. The boss of the pinion *f*, is surrounded by a friction-hoop *l*, which is formed in two parts, drawn together by bolts, so as to gain sufficient hold for causing the gearing to revolve; and it is provided, at its under part, with projections *m*, of which there are four in the circumference. Beneath this hoop *l*, is a clutch *n*, with similar projections; which clutch is free to slide upon the shaft *b*, but is caused to revolve therewith by means of a feather. To the clutch *n*, is adapted a fork *o*, turning upon an axis *p*, from which there extends a lever *q*; the end thereof being connected to a rod *r*, passing through a guide-plate at bottom. The rod *r*, is furnished with a projecting part *s*, and on the other side is connected to a lever *t*, turning upon a fixed fulcrum. To the drum *d*, is attached a chain *u*, provided at its other end with a clamp *v*. When it is desired to draw forward the required length of wire, this clamp is caused to grasp a portion which has been passed through the die: the attendant then places his foot upon the projection *s*, of the rod *r*, by which means the lever *q*, will be depressed, so as to turn the axis *p*, upon its centre; thereby raising the clutch *n*, and causing the pinion *f*, to revolve through the intervention of the friction-hoop. Through this revolution of the pinion *f*, a slow rotatory motion will be imparted to the drum *d*, by means of the gearing before described; whereby the chain *u*, will become coiled upon its periphery, and the clamp *v*, will draw the wire through the die. When a sufficient length has been obtained, the attendant, by removing his foot from the projection, will allow the clutch *n*, to fall, and the motion of the drum *d*, will be arrested. In order, however, to ensure the disengagement from the driving power, the lever *t*, is provided, which, being depressed, will cause the axis *p*, to turn upon its centre, so as to carry the clutch *n*, downward. The end, it will be observed, is thus drawn through the die by one attachment only of the clamp; and it is therefore free from those numerous indenta-

tions which are consequent upon the ordinary method of operation; and, as the power exerted is continuous and uniform, the material is not submitted to those sudden strains by which it is so frequently broken. As a further precaution against breakage, the friction-hoop *l*, before mentioned, is adapted as a medium for communicating the power; for, should an excessive resistance take place, the hoop will slip around the boss of the pinion *f*, and the drum *d*, will remain stationary. The arrangement of gearing is calculated to effect a slower revolution of the drum *d*, than that of the ordinary drum *a*; and this speed may be modified as thought desirable. The end of the wire having been drawn as above described, it is to be attached, in the usual manner, to the drum *a*, and wound thereon, as commonly practised.

The patentee claims the application of a second horizontal drum carrying suitable apparatus for drawing the wire, for the purpose above set forth.

To James Bowron, *of Tyne and Tees Glass Works, South Shields, for improvements in the manufacture of crown, sheet, plate, and bottle-glass.*—[Sealed 30th March, 1853.]

This invention consists in a modification of the furnaces used at present for founding crown, sheet, plate, and bottle-glass, by which, in a furnace of a given size, two additional pots of metal can be founded. This is done by continuing the sieges across the ends of the furnace, in the same way that they are already placed at the sides; and upon these end sieges the additional pots are placed. The level of the grate-room is lowered, and the feeding is from the caves.

In Plate X., fig. 1, is a ground plan of the sieges of a rectangular glass furnace for founding crown, sheet, plate, and bottle-glass; fig. 2, is an end view of the furnace, both within the glass-house and in the cave; and fig. 3, is a longitudinal section taken through the line A, B, of fig. 1, which is a ten-pot furnace. It is well known that heretofore, in building furnaces for founding crown, sheet, plate, and bottle-glass, they are usually built in the form of a bridge,—the pots standing by the sides, and the grate-room running from end to end through the centre. The pots *a*, *a*, are introduced, and the ends built up,—leaving openings *b*, *b*, for supplying the fuel. In the present arrangement of furnace it will be seen that the old form of furnace is retained; but the grate or fire-bars *c*, *c*, are set much lower than usual, which allows of the introduction of the fuel from the caves *d*, *d*, in place

of its being fed through the ordinary openings at the ends of the furnace. The sieges are continued by throwing arches over that which would otherwise be grate-room, and upon the additional sieges the extra pots are placed.

The patentee remarks that it has before been proposed to make furnaces for founding flint-glass with sieges all round;—he does not, therefore, claim the same, nor does he confine himself to the details herein explained;—but what he claims is, the constructing of furnaces for founding crown, sheet, plate, and bottle-glass, with sieges at the ends as well as at the sides.

To William Keates, *of Liverpool, merchant, for improvements in the manufacture of tubes and mandrils,—being partly a communication.*—[Sealed 24th March, 1853.]

This invention, in so far as it relates to the manufacture of tubes, consists of the following improved modes of operating, and in the use of certain improved constructions of apparatus as hereinafter mentioned. These improvements are applicable chiefly when manufacturing tubes from soft metals and alloys, such as copper, brass, and other such metals or metallic compounds; but some of them may also be applied in cases where tubes are being formed from hard metal, such as iron.

In carrying this invention into effect, a hollow cylindrical ingot or billet, of the required metal or alloy, is first cast in a cast-iron or other suitable mould, having a cast-iron or other metal core in the centre, for the purpose of forming the circular aperture through the centre of the ingot or billet. It is preferred that such core should be slightly tapered, to admit of its being started as soon as the metal begins to set, in order that the metal may contract when cooling. In casting the ingots or billets in copper or its alloys, it is desirable that the following conditions should be observed:—First, that the thickness of the metal should not be less than half an inch; and, second, that the bore of the ingot or billet should be larger than that of the finished tube for which it is intended to be used. The alloy preferred to be used consists of 62 parts of copper and 38 parts of zinc when cast; but a sufficient additional quantity of zinc should be employed to cover the waste of this metal in the melting operation. The ingots having been cast in the manner just described, they are brought to a red heat in any suitable furnace, and then put on a hot or cold mandril, according to circumstances, and passed between grooved rollers, as often as can be done while

the metal retains a sufficient degree of heat to allow of its being rolled without cracking. The partially-rolled tube is then re-heated, and the process of rolling continued through rollers having grooves of gradually decreasing size, until a tube is produced of the requisite length and diameter; or it is left somewhat shorter and thicker than required for use, in order to admit of finishing, by rolling cold and drawing, as hereinafter described; which latter processes are requisite when the tubes are required to be of very uniform substance and smooth surface. In re-heating the tube between the rollings, which must be done as often as the tube becomes cool, it may either be taken off the mandril by means of a draw-bench, and introduced alone in the furnace, or the mandril may be introduced into the furnace with the tube upon it, so that both may be equally heated. The advantage of the latter mode of proceeding consists in its effecting a saving of time and labor, while it ensures that the tube shall remain hot for a much longer period than when a cold or moderately-heated mandril is used, and thus the process of rolling is greatly facilitated. When it is required to finish the tubes by cold rolling, and drawing through dies, the cold rolling is performed in the same manner as the hot rolling, except that the tube and mandril are cold instead of hot. In rolling the tubes, whether hot or cold, care should be taken, each time the tube is passed through the rolls, to turn it round about one-fourth of a revolution, so that each portion of its surface shall successively come in contact with each portion of the groove. The drawing of the tubes is accomplished by means of a powerful draw-bench of any approved construction, by which they are drawn, whilst upon steel mandrils, through steel dies of the required dimensions. The rolling-mills preferred to be used for the purpose of rolling metal tubes, either in a hot or cold state, are constructed with grooved rollers, arranged two or three in a set, resembling, in their general structure, the rolling-mills used for rolling iron or copper bolts and bars. The form of groove, however, is not that of a semicircle, which is that commonly adopted in such cases, but a compound curve, made up of two semicircles of different radii,—the radius of the semicircle, forming the sides of the groove, being shorter or less than the radius of the semicircle which forms the bottom of the groove. The method of forming or setting out the groove will be seen by referring to fig. 1, Plate X., which is an elevation of a portion of a pair of such grooved rolls in working contact. Let the centre line A, B, be the vertical diameter of a circle, which would be formed by two

semicircular grooves, described from the centre C, with the radius C, A. Divide the circumference of this circle into four equal parts at the points D, E, F, G; then, upon the diameter A, B, set off the two points or centres *x*, and *o*, at a distance equal to one twenty-fourth of the radius A, C, on each side of the centre C; then, with *x*, as a centre, and the radii *x*, D, and *x*, G, describe the arcs D, *a*, and G, *d*, the compound curve *a*, D, A, G, *d*, will be that of the required form of groove. The form of the other groove *b*, E, B, F, *c*, is determined in the same manner, with the centre *o*, and the radius *o*, E. The corners of the grooves are rounded off a little to prevent their wearing or chipping off too fast.

The patentee does not confine himself to the exact form of groove shewn, so long as the arcs, forming the sides of the groove, are of less radius than that constituting the bottom of the groove.

The mandrils used, when rolling and drawing tubes, as before described, may be composed of steel or iron, as may be deemed preferable; and they may be either of the ordinary construction or of the construction hereinafter described.

This invention, in so far as it relates to improvements in mandrils, consists of the improved compound mandril represented in figs. 2, 3, 4, and 5; which mandril is composed, firstly, of a central shaft or axis, similar to an ordinary mandril, of any of the various kinds in common use for drawing, rolling, or turning, or as working mandrils for machines, such as printers' mandrils, used for carrying the metallic cylinders or rollers employed in printing textile and other fabrics; and, secondly, of an external shell, tube, or cylinder, formed of three segments, and a wedge or tongue, by which they can be tightened up when required. The edges of the segments are accurately jointed by planing, and those of the wedge or tongue (which tapers in breadth from end to end) are fitted up in a similar manner. In using this mandril, the cylinder, or other article to be carried by it, is slipped over the central shaft or axis of the compound mandril; the segments of the shell are then introduced in their proper order; and, finally, the whole is fixed or tightened up by inserting the wedge or tongue, and hammering it in.

Fig. 2, is a plan of the compound mandril complete, with a copper roller *d*, upon it, and fig. 3, an end view of the same. Fig. 4, is a section of the central shaft *a*, and an end view of the shell *b*, and roller *d*; and fig. 5, is a plan of the shell *b*, with the wedge *c*, uppermost, to shew the taper in its breadth. *a*, is the central shaft or mandril, having a slot *e*, to receive

the nib *o*, projecting from the internal surface of one of the segments of the shell *b*, to prevent the latter from turning or slipping round upon the shaft; *b*, is the shell formed of three segments (or a greater number of segments might be used) and a wedge *c*; *d*, is a copper cylinder or roller, of the ordinary construction, having a nib *x*, which fits into a slot on the external surface of one of the segments of the shell of the compound mandril, for the purpose of preventing the roller from slipping round upon the shell.

The patentee claims, First,—the casting of hollow circular ingots or billets of brass and other alloys of copper in iron moulds, with iron or steel cores, for the manufacture of tubes therefrom, as hereinbefore described. Secondly,—the rolling of ingots or billets, employed in the manufacture of tubes, through or between rollers, having grooves of the peculiar form represented in fig. 1. Thirdly,—the use of mandrils heated to any required temperature, when rolling tubes as hereinbefore described. And, Fourthly,—the improved compound mandril hereinbefore described.

To William Matthews, *of St. James-street, Nottingham, piano-forte manufacturer and musician, for improvements in piano-fortes.*—[Sealed 7th March, 1853.]

This invention consists, firstly, in substituting, in lieu of the wood stickers hitherto employed in the construction of upright piano-fortes, thin rods of brass or other suitable metal, between which the strings of the instrument may be seen; the object and intention of this arrangement being to offer considerably less obstruction to the sound than by the use of wood stickers.

Secondly, in the use and application of a new mechanical movement, denominated a propeller action, which is employed in lieu of the hopper action hitherto used in the construction of upright piano-fortes.

Thirdly, in an improved mode of constructing, arranging, and disposing the dampers of piano-fortes,—the object being to remedy the unsteadiness in their action; which objection is remedied by placing the dampers underneath the hammers, and out of the way thereof; and further, by so constructing the dampers as to cause them to approach the vibrating strings steadily in an oblique direction, and thereby cause them positively, but silently, to cease their vibrations quickly.

Fourthly, in the use and application to upright piano-fortes

of one, two, or three sets of hammers, in addition to the hammers usually employed, and this without increasing the size of the instrument. These hammers are made of different degrees of hardness, for the purpose of eliciting different qualities of tone in one and the same piano-forte. A series of steel vibrators is also employed, in combination with such hammers, for the purpose of obtaining additional as well as different qualities of tone, which may either be used distinct from or in combination with the tones produced by the vibration of the strings of the piano-forte.

Lastly, instead of making those parts of the frame which are employed to support the above, of wood, as hitherto practised, it is proposed to make them of angular-shaped bars of iron or brass, which produce unusual lightness in the entire action. And the outer frame, in which the hammers and dampers are arranged, is connected to the case of the piano-forte by pivots, at the under side thereof, and to one of the pedals of the instrument, to permit the frame being slidden sideways, so that the hammers may be made to strike either one or two strings; and also for the purpose of bringing all the dampers away from the strings, when necessary, by means of another pedal connected to the frame.

In Plate X., fig. 1, is a front elevation of a portion of a piano-forte constructed according to this invention; and fig. 2, is a transverse vertical section of the same, taken through the line A, B, of fig. 1.

A, A, is a portion of the outer case of a piano-forte; B, a framing of iron; C, D, are angular-shaped bars of metal, the ends whereof are securely fixed to the framing; and E, F, are pieces of wood hinged together with vellum, as usually practised in the manufacture of the hinged movements of piano-fortes. The piece E, is weighted at 3, with lead, to ensure its descent upon the piece F, which is buffed at 4, to receive it. The part 5, of the piece E, is glued to the piece F; and the part 6, of the piece F, is glued to a strip of wood fixed to the angular-shaped piece G, which is securely fixed to the frame B, in any convenient manner. H, is one of the ordinary keys of a piano-forte, into which a pin *a*, is securely fixed: the upper part of this pin is screwed into a wooden cap *b*, the upper end whereof comes into contact with the under side of the piece F, which is buffed to receive it. I, is a brass rod or sticker, the lower end whereof is screwed into a piece of wood b^1, hinged to the piece E, with leather. The upper end of the rod I, is also screwed into another piece of wood *c*, which is connected to the under side of the butt *f*, of the hammer K, by a piece

of leather glued thereto. *d*, are other pieces of wood hinged together, as shewn: the lower part thereof is glued to the piece *c*; and the upper part of the piece *d*, has a piece of bent wire *z*, screwed into it. This wire passes through a hole formed in a bar *e*, which is securely fixed at its ends to the framing B; and upon the upper end of this wire a damper X, (denominated a "soothing damper") is screwed, and placed opposite to one or more of the strings of the instrument; and, in juxta-position, a series of such dampers is placed and arranged opposite to the strings and keys of the instrument. A series of hammers K, is also connected to the bar C, by pins passed through pieces of wood *f*, or hammer butts, to which the piece *c*, is glued,—such pins being held in position by a strip of brass *x*, screwed to the bar C. There is a piece of wood *g*, glued into the piece *f*, and the upper part of the wood passes through the hammer K, which is buffed in the usual way. L, is a rod or rest for the hammers, when out of action; which rod is fixed at its ends to the framing B, and covered with cloth. M, is one of the intermediate hammers before mentioned: these hammers are placed immediately above the soothing dampers, and in a position to be struck by the hammers K. The hammers M, are securely affixed to a bar N, by solder or otherwise. The part 10, of these hammers is formed of a piece of tempered steel, and the part 11, is of brass, soldered to the part 10, and is buffed round its surface; and to the part 12, a piece of hard leather, of a wedge shape, is attached, for the purpose of throwing back the hammer K, in the event of its being in the way of the intermediate hammer. As it descends, the bar N, having a vertical movement, is retained and guided in its proper course by rods *h*, *h*, passing through guide pieces *i*, which are securely fixed to the case of the instrument; and there are rods O, securely fixed to the bar N, the lower ends whereof are in connection with one of the pedals of the instrument; so that, by depressing the pedals, the bar N, and intermediate hammers, will be brought down, the rising thereof being effected by springs *k*, attached to the upper ends of each of the rods *h*, and to the top of the case of the instrument, or other convenient part; and the sliding of the frame B, and hammers, sideways, may be effected by attaching one end of a cord *l*, or lever, to the frame B; and the other end of the cord or lever is connected to the other pedal of the instrument; so that, by exerting pressure upon this pedal, the frame B, and hammers, may be moved or slidden in one direction, and in the opposite direction by a spring *m*; one end whereof is attached to the case of the instrument, and

the other end to the frame B, as shewn. The construction and arrangement of the additional hammers before mentioned is as follows:—P, is a piece of wood, extending across the entire width of the inside of the case of the instrument, to which it is securely fixed; or it may be attached thereto by pivots, for the purpose of bringing the hammers R, into action by means of the pedal connected to the piece P. The piece P, has projecting pieces *p*, *q*, fixed to or formed thereon; and to the piece *p*, pieces of wood *q*, are hinged, as shewn; and the piece *q*, is buffed at those parts where the pieces Q, come into forced contact, by pressure of the springs *r*, of which there is one placed at the back of each of the pieces Q; and these pieces are arranged over each of the hammers K, and opposite thereto. The ends of the pieces Q, against which the upper ends of the wood *g*, strike, are buffed; and to the upper ends of each of the pieces Q, a hammer R, is connected by a screwed wire 13. The surface of this hammer is buffed, similar to those before mentioned, and is adjustable within the piece Q, by means of the screwed wire. S, is one of a series of tempered steel vibrators, the upper ends whereof are securely fixed to a piece of wood T, attached to the case of the instrument; and to the under side of the piece T, a wooden box U, is attached, denominated a sounding-box; which box is formed deeper at one end than at the other, for the purpose of assisting in eliciting different qualities of tone from each vibrator; and the vibrators are made of different lengths, for the purpose of eliciting a different tone or pitch from each other.

Assuming the several parts to be in the position exhibited, by exerting pressure upon one or other of the keys H, the piece *b*, coming into contact with the under side of the piece F, will raise such piece, together with the parts connected thereto; and the effect of such movement will be to cause the hammers K, to approach and strike the wires *z*, of the instrument, or the intermediate hammers M, if acted upon by the pedal; and at the same time to withdraw the dampers X, from the strings. Upon the pressure being removed from the keys, a reverse movement of the hammers K, and dampers X, will take place,—the hammers falling back into the position shewn; and, simultaneously with this movement, the dampers will have been brought into contact with the strings, and thereby caused to check the vibrations thereof. Supposing the instrument to have the additional hammers R, and vibrators S, attached thereto, it will appear evident that the upper end of the wood *g*, coming into contact with the piece Q, will impart motion to the hammer R, and cause it to strike that

vibrator to which it is opposite, and thus produce an additional and different quality of tone. The rail W, is employed as a stop to limit the action of the piece F; and the piece *b*, is for the purpose of adjusting the action of the hammers K, and soothing dampers.

The patentee claims the mechanical arrangements and combinations of parts hereinbefore particularly described and represented at figs. 1, and 2.

To HENRY LAMPLOUGH, *of Gray's-inn-lane, for improvements in the preparation and manufacture of certain effervescing beverages.*—[Sealed 16th July, 1853.]

THIS invention consists, first, in the use of tartralic and tartrelic acids, with some alkaline base, and of solid carbonic acid, in the manufacture of effervescing beverages, which may or may not be flavored or sweetened; secondly, in the use of racemic acid, or its compounds, paratartralic or paratartrelic acids, or anhydrous malic acid, combined with some alkaline base, and with solid carbonic acid, for the manufacture of effervescing beverages; and, thirdly, in the use of citric acid, deprived of its water of crystallization, or its compounds—pyro-citric, pyro-aconitic, or the pyro-itaconic acids, combined with alkali and solid carbonic acid for effervescing drinks. The following is a description of the process adopted in such manufacture:—Take tartaric acid, and subject it gradually to a heat of 300° Fahr., or to a less degree of heat, continued for a longer period, until the tartaric acid is converted into tartralic acid; then subject this last-named acid to heat of a similar degree, until it is converted into tartrelic acid. Tartralic acid possessing but one-fourth of the neutralizing power of the ordinary tartaric acid, and tartrelic acid but one-half of the neutralizing qualities of the common tartaric acid, although both give off, on effervescing, the same amount of carbonic acid, it follows, that when used in the manufacture of effervescing beverages a less amount of neutral salt will be produced than by the ordinary acids and alkalies; and this improved beverage will not act in the same prejudicial manner on the bowels, by giving rise to flatulency, as the ordinary effervescing beverages. Another advantage in their use is, that they will remain unchanged for a longer period of time, and a less quantity is required. Instead of the above acids, racemic acid, or its compounds—paratartralic and paratartrelic acids, and the anhydrous malic acid, similarly prepared, may be used. Citric acid, when deprived of its water

of crystallization by a heat of 212° to 340° Fahr., may also be used. In the treatment of this acid care must be taken to remove it from the oven as soon as white fumes arise; its compounds—pyro-citric, pyro-aconitic, or the pyro-itaconic acids, may also be used, with other fruit acids with which they are isomeric, when combined with some alkaline base in a highly dried or anhydrous state, in the manufacture of effervescing beverages. The manufacture of these acids is well known, and is described in the works of Baup and Cross, and therefore requires no explanation here. The alkaline matters, namely, the carbonates and bicarbonates of soda or potash, to be used with any of the above acids for producing beverages, are to be highly dried by heat, until deprived of their water of crystallization. It is well known that soda water derives a peculiar pungency of flavor from carbonic acid gas; and, in order to give to effervescing beverages, not subjected to pressure, a higher degree of pungency than has hitherto been obtained, a small proportion of carbonic acid, in a solid form, is sometimes added to the acids and alkalis, prepared as above described. The application of water to these preparations will set free a larger quantity of carbonic acid, and form a more agreeable beverage than that ordinarily produced from acid and alkali. Sugar, essences, and oils, may be added *ad libitum*.

The patentee claims the use of concentrated anhydrous acids, such as tartralic, tartrelic, racemic, paratartralic, paratartrelic, and anhydrous malic acid, and of citric acid, and its compounds—pyro-cetric, pyro-aconitic, and pyro-itaconic or fruit acids, all, when deprived of water of crystallization, with alkaline matters, when dried or rendered anhydrous, either with or without the use of solidified carbonic acid, in the manufacture of certain effervescing beverages.

Scientific Notices.

INSTITUTION OF CIVIL ENGINEERS.

March 14th and 28th, 1854.

The discussion was taken on Mr. D. K. Clark's paper, "*On Ruthven's propeller.*"

It was contended, that there was no novelty in the system of propulsion proposed by Messrs. Ruthven. Benjamin Franklin was among the first to notice it: he related, that as a boy, whilst bathing in a pool, into which a wooden pump had been thrown

to swell the timber, he got astride upon it, and commmenced pumping. To his astonishment he found that he was propelling himself across the water. Subsequently, he investigated the circumstances, and admitted the inefficient application of power. Sir Isambard Brunel attempted propulsion by means of a tube, in which there was a diaphragm, pushing the water before it, and acting upon a very light valve on the return stroke: this was only an elongated paddle-wheel with an intermittent and inefficient action.

Mr. Bidder tried the system also, on board a canal-boat; and although quite aware of the loss of power incidental to it, he expected a compensation from the advantageous application of steam, as opposed to animal power.

As to this particular case of Ruthven's and other similar propellers, it was argued, that the reasoning in the paper was totally at variance with the actual results of the experiments, and with the received laws of hydraulics.

To shew this, it sufficed to state, that according to the paper, the usual effect realized, was 64 per cent. of the power of the engine, stated at 40 H.P. (indicated), which would give $25\frac{1}{2}$ H.P. usual effect; but it was stated, in the experiments, that the two nozzles were 10 inches diameter each=together $1\frac{1}{12}$ square foot area. The head of water was $8\frac{6}{10}$ feet=to a pressure of nearly 540 lbs. per foot, or to a total pressure of about 580 lbs., which represented also the resistance of the vessel at $9\frac{1}{2}$ miles per hour; giving, therefore, a useful effect of $14\frac{3}{4}$ H.P., instead of $25\frac{1}{2}$ H.P., as stated in the paper.

It was an error to state, that the maximum of useful effect was when the velocity of the issuing water was equal to that of the vessel, or when the water dropped vertically from the nozzles. It could be shewn, that in that particular condition there was not any development of useful effect. The actual operation of the system of propulsion was then shewn to be analogous to the assumed case of a closed vessel of any shape, filled with a fluid of given density, and under a given pressure. It was evident, that so long as the vessel remained in that normal state, no propulsive force would be exerted in any direction,—the whole being *in equilibrio;* but on an aperture being made in either of the sides of the vessel, it was obvious, that the area of the opening, being relieved from pressure, the *equilibrium* would be disturbed, exactly by the extent of that aperture into the head, and there would be a corresponding force exerted in the opposite direction.

To apply this to the case under consideration, a vessel must be imagined containing water under a pressure = to 3 feet, which was the head due to the velocity of the vessel in the experiment. By making an aperture of about $3\frac{1}{8}$ feet area, there would be an unbalanced pressure of about 580 lbs., equivalent to that of the former statement; but the velocity of issue would be 14 feet per second, and the power used would be about 15 H.P. But if the

aperture were assumed to be reduced to $1\frac{1}{12}$ square foot = the area of the two nozzles—then it would require $8\frac{6}{10}$ths feet head to produce the same pressure. The velocity of issue would be 23 feet per second, and the power would be about 25 H.P.; thus the power required was exactly in the ratio of the velocity of issue, or inversely as the square root of the head. The loss was therefore 60 per cent. instead of 12 per cent., as stated in the paper.

But the fundamental error in the paper was, the omission of the loss of power arising from picking up the water in a state of rest, and communicating to it the velocity of the vessel. Supposing the water to be composed of an infinite number of globules possessing weight, and being in a state of rest, they must all be raised to the head due to the velocity of the vessel, and then to the additional head requisite for propulsion.

In the present case the quantity of water issuing from the nozzles was 25 feet per second: this required to be raised 3 feet to be equivalent to the velocity of the vessel—demanding therefore the exertion of 9 H.P. The results of the experiments would be more correctly stated thus:—

Useful effect		$14\frac{3}{4}$ H.P.
Power consumed in raising the water to the velocity of the vessel	=	9 H.P.
Power used in propelling the water through the nozzles	=	25 H.P.
Total power expended, exclusive of the friction in the water-ways, and of the engine itself	=	34 H.P.

It was contended in reply, that though engine power was consumed in getting the water up to the speed of the vessel, it did not necessarily follow that an equal amount of power was further required to expel the water. This single employment of power could be arrived at, by properly forming the water passages so as to avoid all concussions of the water, by rectangular bends, or by sudden enlargements or alterations of form; and the desired object was stated to be, so to proportion the dimensions of the engine and the propeller, that the effluent speed of the water in one direction would be equal to that of the vessel in the other. In this case it was stated, 100 per cent of the engine power, minus fractional resistance, would be usefully available.

Portions of the evenings of the 14th and the 28th of March were devoted to the discussion of Mr. Yates' paper, "*On the advantages of uniformity in European weights, measures, and coins.*"

Reference was made to the practical working of the proposed change of the present currency to the French decimal system, and the numerous inconveniences to which commerce would be sub-

jected in the re-adjustment of all contracts, debts, exchanges, etc. The intricacy of settling accounts would be infinite, and no corresponding advantage would result. The *franc* shewn in the scheme was not, in reality, equivalent to the French coin of that denomination; it was ten-pence: and all the other coins would be equally fictitious.

It was assumed, that the first step towards fixing a decimal system must be, the adjustment of the proportional value of the present coins, and eventually of a new issue: a corresponding arrangement of the weights and measures would soon follow.

The following technical points were then considered with regard to coins:—1st. The standard of fineness; 2nd. The relation of coins to the denomination or money of account of the country wherein they circulated; and, 3rd. The metallic standard.

First. The standard of fineness depended on the quantity of alloy introduced in the process of manufacture, or coining. If this were identical in all countries, great trouble would be avoided; but it was argued, that practically such an accordance was scarcely attainable; and in fact, that a table of exchange values met the difficulty of the present discordance.

Second. In order to shew how difficult of attainment would be an assimilation and interchange of British coins with those of other countries, it was argued that in the United States of America, where the currency was practically based on a gold standard, the eagle, whose value of ten dollars, = about £2. 1s. English, and the half-eagle, =£1. 0s. 6d., or very nearly the English sovereign, it would be necessary to raise one standard, or to lower the other, in order to do away with the apparent difference of 2½ per cent. now existing; and this would involve the re-coining of the whole circulation of one or the other country, at a certain and great expense, and at the imminent risk of complicating all existing pecuniary engagements. It was urged, that the scheme of assimilating the present coins to the French franc, etc., was equally fallacious; in fact, that the new franc would only be ten-pence English, and not of the exact value of a French franc, which equalled 9½ pence; and so on for the rest of the proposed series; thus shewing a real difference of 4½ per cent., which was too much to be sacrificed in mercantile or monetary transactions.

The dollar was argued to be equally fallacious as the unit, inasmuch as the various dollars of the several countries, and even of the same country, had different values, and not one of them possessed the precise value of fifty pence English, which had been assumed.

Third. That which opposed the most serious obstacles was the metallic standard. There could be no real par of exchange between countries, without a previous agreement as to adopting either a gold or a silver standard; because the relative value of the two metals was constantly fluctuating. The discovery of gold in California and in Australia, followed by an excessive demand for silver

for the East, would probably produce great changes: even at this moment, gold was partially displacing silver, as a standard, in France, where there was, apparently, in progress, a change similar to that which had taken place in the currency of this country, during the last century, ending in the final adoption of a gold standard in 1816.

The pound sterling being now admitted to represent the value of the quantity of gold contained in a sovereign,—all the silver and copper coins being mere tokens, representing certain fractional parts of the pound,—all pecuniary engagements had reference to the pound; and silver was a legal tender only up to forty shillings. It was argued, that the money of account should correspond with the money upon which existing contracts depended; and therefore the pound sterling should be decimalized, rather than attempt a spurious adaptation of the coins of this country to the system of any other nation.

It was urged, that if the value of ten shillings was adopted as the integer, a simple scale of coins would be:—

10 mills	=	1 penny.
10 pennies	=	1 shilling.
10 shillings	=	1 eagle.

This, like most of the other schemes for adopting a new nomenclature, was diapproved of.

It was contended, that the present was an appropriate moment for the proposed change, as there was a somewhat similar movement in the U.S. America;—the Zollverein had held a monetary congress; and almost simultaneously there had been a meeting at Brussels, relative to the international adoption of Lieut. Maury's system of naval observations. The simultaneous change of coins, weights, and measures, was therefore urged.

On the other side it was contended, that any rash attempt to adapt the monetary system of this country to that of any other, must be productive of the greatest confusion, and of the most disastrous effects in all mercantile and financial transactions. After reviewing the history of English coins and weights from the period of the Norman Conquest, it was shewn, that the present gold standard tended to maintain the purity of the coinage; that the franc was not and could not be ten-pence of the current coin; that the subordinate coins to the sovereign, being only tokens, none of them could be assumed as the integer; that the time was fast approaching, when, in France, the example of America must be followed, and a gold standard must be adopted; that the value of an English sovereign was so generally recognized, that it passed current in almost all countries, especially on the continent. This might be due, to a great extent, to the care in the manufacture at the Mint and the critical supervision at the Bank of England, where any sovereign, having lost more than three-quarters of a grain in weight, was detained, as being unfit for circulation. The present system being so nearly decimal, it would suffice to declare,

by Act of Parliament, that the pound should be divided into 1000 farthings, and the change would soon work itself, practically, into all commercial transactions. During the transition, the present coins would be stamped with a decimal value: the actual loss would be only a small per-centage on the value of present copper coins; and the new ones would, at no very distant period, displace them.

The same process would take place with weights and measures; and, in all cases, the adoption of a new nomenclature was specially objected to.

The system proposed by General Sir C. W. Paisley, in his work on the subject, was described, and a statement was promised to be appended to Mr. Yates's paper, by which it was contended, that it was demonstrable, that a simplification of the present English coins, &c., would be more advantageous than the adoption of any of the foreign systems, none of which were adapted to the commerce of this country.

After reviewing the arguments of the previous speakers, it was contended, that the opposition to the author's views was untenable, as the benefit to be anticipated from the introduction of a decimal system was admitted; and it was only urged against it, that it would be impracticable to get all countries to agree. Now, if England and her colonies adopted the system, already accepted in France, and which had made great advances in other continental states, there would be so large a preponderance in commercial transactions, that other countries would soon follow.

It was contended, that the arguments used against the French system of weights, measures, and coins, had only demonstrated its beauty and fitness for nations in all stages of civilization; and this has been proved by the progress made in its establishment, not only in France, but in almost all countries, when accuracy of observation for scientific purposes was demanded.

It was proposed, as a means of aiding and familiarizing the public mind with decimal divisions, to have engraved on all thermometers, the Centigrade as well as the Fahrenheit scale, so that in time the latter might be dropped and the former be adopted.

The objection of the Astronomer Royal to the adoption of the mètre, as a standard of length, was contended to be valid: there was no advantage in obtaining a standard from astronomical and other observations; in fact, the present standard yard, as recognized by law, appeared to be sufficient for all practical purposes. His proposition as to the chain and link, was not however agreed to. On the contrary, it was argued, that by dividing the present foot into 10 inches, instead of 12 inches, and the inch into ten parts, a scale which was familiar to all draughtsmen and to many artisans, would be introduced, which would be easily understood and would soon be adopted. The foot would be divided into 100 parts, instead of into 96 parts; so that $\frac{1}{10}$ might be substituted for $\frac{1}{8}$, with very slight disadvantage. In which case the link of

the measuring chain, instead of being represented by 7·92 inches, as at present, would be represented by 6·6 inches, which would be a very convenient proportion for calculation, and it would possess the additional convenience of enabling the superficial inches in a link to be represented by the same figures as those of the superficial feet in an acre; viz., 43·560 inches in one square link,—and 43·560 square feet in one acre.

As to weight, all that could be required, was for the legislature to decree, that it would recognize no conventional values for the cwt. or the ton; but that the cwt. should be represented by 100 lbs., and the ton by 2000 lbs.; the stone being then 10 lbs. The lb. might, if necessary, be decimalised, as it was at present by the bullion dealers, for the special requirements of that commerce; but even without that, the chief facilities would be acquired, and practice would soon render the system familiar and convenient.

April 4th, 1854.

After the reading of the minutes of the last meeting, it was observed, that the statements in the paper on Ruthven's propeller had been misunderstood; as it had been assumed, that the paper stated the useful effect realized, as 64 per cent. of the whole power of the engine at the pistons; whereas it was really stated to be 50 per cent., and that the useful effect was 64 per cent. of the power delivered to the wheel shaft; which would materially affect the deductions then made.

That one most important element in the calculation was lost sight of, namely, the duplicate pressure of reaction due to the efflux of water through the side of a vessel at rest,—the whole unbalanced hydraulic pressure being twice the hydrostatic pressure due to the height of the column of water. It was contended, that this duplicate pressure must exist to some extent, so long as the effluent velocity of the water exceeded the receding velocity of the vessel; and that it diminished, in some ratio, with the receding speed of the vessel, and vanished only when the vessel had acquired the effluent velocity of the water,—when the simple pressure, due to the head of water, remained. Therefore, that some allowance must be made for this duplicate pressure; and that, assuming it to decrease uniformly with the difference of speeds, the power would be thus estimated, when the speed of the vessel was 62 per cent. of that of the effluent water; leaving 38 per cent. of excess:—

$1 \times 100 = 100$ per cent., when the speed of the vessel was equal to that of the effluent water.

$1{\cdot}38 \times 62 = 85{\cdot}56$ per cent. when the speed of the vessel was 62 per cent. of that of the effluent water.

Leaving 14·44 per cent. of loss, by excess of speed, as originally deduced in the paper.

It was added, that the proportion of the useful effect would be more simply estimated in the ratio of the squares of the speeds, as was done in the paper, thus:—

$$100^2 : 38^2 : : 100 : 14{\cdot}4 \text{ per cent.}$$

The proposition of the power employed was reduced nearly to common algebra, by separating the various causes and effects: the useful effect, in proportion to the power employed, was shewn to be a maximum, when the speed of the boat was equal to the velocity of the effluent water,—the *vena contracta* being taken into consideration. The ratio of useful effect to power employed was shewn to be $\frac{2\,N}{N^2+1}$. The velocity of the effluent water being to the velocity of the boat as N to 1.

It also appeared, that taking the sum of the useful effect, that is, in driving the boat, added to the effect not so employed, or wasted, was, in all cases, equal to the power employed: it was of no importance, theoretically speaking, whether the water was pumped up from the bow, the sides, or the bottom.

The subject was investigated in three different ways, each giving the same result.

It was stated that, in 1848, Mr. Purkis, being engaged in the construction of a fan-blower, thought the same principle might be adapted to the propulsion of a boat, and tried it in a model, about 4 feet long, and 8 inches wide, with a small steam-engine and two fans, each 2 inches in diameter; with this he attained a speed of 3 to 4 miles per hour. He then built another boat, 25 feet long and 4 feet wide, fitted with an engine with two cylinders, 4 inches diameter and 4½ inches stroke, driving two fans 12 inches diameter, of the same form as the fans of Appold's pump,—the water issuing from two orifices, each of 25 square inches. With this apparatus the boat could only hold her way against a tide of about 3 miles an hour. On the substitution of two fans of 7 inches diameter, and the reduction of the propelling orifices to 7·75 square each, the boat attained an estimated speed of nearly 8 miles an hour. It was admitted, that these experiments were imperfect, but they tended to corroborate the statements of the performances of Ruthven's propeller.

The arrangement of Purkis' boat differed from Ruthven's chiefly in their being three holes on each side of the vessel; one to propel her ahead, one astern, and one midship to supply the pump; each being supplied with a valve to close the orifices not in action, and to act instead of the curved nozzles of the "Enterprise," which were supposed to be objectional in absorbing power.

The first paper read was, "*On the prevention of smoke in engine and other furnaces*," by Mr. James Simpson, jun.

The annoyance of smoke incidental to the increase of habitations, and to the extension of manufactures in all cities and large

towns, had been noticed reprehensively, even as early as the time of Charles the Second, in whose reign it was proposed to legislate on the subject; and, in 1697, Dr. Papin devised a scheme for forcing air down a pipe immediately above the incandescent fuel, to induce more perfect combustion.

The attention of parliamentary committees was devoted to the subject in the sessions of 1819 and 20, and again in 1843, when a very complete history of the subject was given in the report, with a clear recapitulation of the scientific evidence, recommending a freer admission of air to the furnaces as the "great, if not the only, principle for preventing smoke." In 1845, two other committees reported, "that opaque smoke, issuing from steam-engine chimneys, might be so abated as no longer to be a public nuisance;" and, in 1853, the "Smoke Nuisance Abatement Act" was passed, and was ordered to come into force in August, 1854. This act rendered it compulsory on owners of engines and furnaces to provide means for preventing the emission of opaque smoke; and it applied also to steam vessels navigating the Thames above London Bridge.

An enumeration was then given of the local acts, into which clauses had been introduced for abating the nuisance of smoke; whence it appeared, that there had been an anxious desire to find means of attaining so desirable an end; and the double furnace, fired alternately, now so extensively used at Manchester, was alluded to.

The chemistry of combustion was then examined, in order to shew that to imperfect combustion alone must be attributed the annoyance, as well as the serious pecuniary loss, now experienced in the emission of opaque smoke from furnaces generally. It was shewn, that a good furnace should prevent the formation of smoke by burning all the carbon of the gas evolved; or, in other words, by combining, at a certain temperature, each atom of carbon in the gas with two atoms of oxygen, before it left the furnace; which combination was the best for giving out heat and for evaporating fluids, with the least expenditure of fuel.

The various methods of introducing atmospheric air to the furnaces, and of diffusing it among the gases, were then examined; shewing that the admission should be through numerous apertures, so arranged as to permit accurate regulation, as a greater quantity was required, after the period of adding fresh fuel, than when the fire was burning brightly and freely.

The various mechanical means and apparatus, proposed for this object, were reviewed; and it appeared, that in many of them the combustion was, to a certain extent, imperfect, and the machines were liable to derangement; that the alleged saving of fuel depended, chiefly, on the manner of stoking; and that it might be attained by a judicious modification of the grate of any well-set boiler, and by a greater amount of attention on the part of the fireman, without any mechanical appliances.

The regulation of the air supply, by machinery, had been found to fail, in many instances, on account of the variation in the qualities of the fuel; and it was contended, that it was more advisable to entrust it to the discretion of the fireman, than to rely upon self-acting apparatus; which might, however, be advantageously used for indicating the state of the furnace.

The employment of anthracite and Welch steam coal was advocated, not only on account of the absence of opaque smoke, during their combustion, but also on the ground of the economy arising from their great evaporative power.

The second paper was "*On the management of furnaces and the prevention of smoke,*" by Mr. C. W. Williams, Assoc. Inst. C.E.

The object of this communication was to endeavour to remove the mystery which had hitherto obscured what was asserted to be one of the simplest and best understood processes of nature, namely, the combustion of the gaseous products of coal. A short analysis of the chemical details, connected with the subject, was given, to shew that the existence of flame did not imply the combustion of gas; that it was but the preliminary state of high temperature of the numerous atoms of the carbon of the gas, which was caused by the intense heat produced by the combustion of the other constituent—the hydrogen.

In effecting the combustion of the gas generated from the coal in a furnace, the first process was merely mechanical, and consisted in bringing the atoms of the gas, and those of the air, into the most intimate state of mixture; such mixture being the *sine quâ non* of subequent chemical union. The mode or means by which this chemical admixture could be effected, in the most rapid and intimate manner, involved all that art or human ingenuity could do towards producing perfect combustion.

As to the mode of effecting this mixture, or of bringing together the atoms of air and gas, reference was made to the Argand gas-burner, as supplying a good illustration; the only difference being, that in the Argand burner the gas was projected into the air in numerous small jets or films; whereas, in the furnace, the process was reversed,—the air being brought to the gas, in a similar manner, by means of numerous orifices.

In both cases the effect was identical, and might be compared to the rose of a watering-pot, or of an artificial *jet d'eau*;—namely, the producing, on the instant, the largest area of surface for mutual and atomic contact. Models and drawings were exhibited, shewing the facility and simplicity with which, both in land and marine furnaces, hundreds of small orifices were introduced, so as to effect the most intimate mingling of the air with the gaseous products of combustion.

It was stated, as the result of considerable experience, that it was a matter of perfect indifference in what part of a furnace or

flue the air was introduced, provided this all-important condition was attended to and satisfied; namely,—the effecting the mixture of the air and the gas before the temperature of the latter was reduced below that of accension or kindling. This, according to Sir Humphrey Davy, should not be under 800° Fahr., as ignition could not take place at a lower temperature,—that fact being the principle of safety in the miner's lamp.

Previously to the introduction of the tubular, in place of the flue system in marine boilers, it had been supposed, that the introduction of the air on the Argand principle, by a perforated plate behind the bridge, satisfied all that nature required in producing perfect combustion. The tubular form of boiler, however, rendered a different arrangement absolutely necessary. This was occasioned by the run or distance between the bridge and the tubes being so very short; and, consequently, the passing along that distance being so limited in time, that the mixing and combustion could not be adequately effected. This, after numerous trials and expedients, led to placing the orifices of admission in the front or at the doorway end of the furnace. The system adopted by boiler makers of contracting the doorways of marine boilers much impeded a successful application of the Argand principle. The enlarging the door-way opening, as shewn in the models, however, afforded sufficient space for the required number of $\frac{3}{4}$ or $\frac{1}{2}$-inch orifices. By this arrangement, the length of the furnace from the door to the bridge was thus, as it were, added to the length of the run. By this mode of construction, the Argand principle had been applied with great success to marine boilers.

The next point considered was, as to the quantity or gross volume of air required, and the area of aperture necessary for its introduction. On this head, it was stated, that a great practical error had been frequently committed, as it had been stated, that it would suffice if the aperture should be equal to $1\frac{1}{2}$ square inch for each square foot of fire surface in the furnace, in the case of single furnaces; and of but half a square inch or ·5-inch for each square foot of grate-bar surface, in the case of double-furnaced boilers.

These proportions were now asserted to be wholly insufficient, and, in fact, were not sufficient to allow of one-fourth the required quantity of air to pass. In practice, it had been ascertained, that for bituminous coal, from 4 to 6 square inches were required for each square foot of furnace; and for anthracite, from 2 to 4 square inches, according to the quality of the coals and the amount of draught. The models and drawings exhibited were stated to be conformable to those proportions.

With reference to the supposed necessity for skilful firemen, the paper stated, that the only duty that should be required from the firemen was the keeping the bars fully and uniformly covered; for if the back end or the sides of a furnace were left uncovered,

the air would pass through them, instead of passing through the air distributors, as that passage offered the hottest and shortest route to the chimney. In fact, it was stated, that unless the bars were well and equally covered, it was impossible to regulate or to control the admission of the air.

As to the use of self-acting valves, to regulate the admission of the air, it was stated, that after numerous plans had been tried during the last ten years, all had been discarded in practice,—being found to be worse than useless. The generation of the gas and the admission of the air through the uncovered portion of the bars, created such irregularity as to defeat all efforts at uniformity; and it was impossible, by any self-acting valves, to obviate the effects of such irregularity. It was observed, that the pyrometer (a model of which was exhibited in action) proved the inapplicability of such valves, and furnished the only reliable test as to the quantity of heat produced and properly applied in the generation of steam. It was also observed, that the colour of the products of the furnace, at the chimney-top, was but a source of error,—the sight-holes and pyrometer supplying all that was necessary, and by which the firemen could alone safely and practically regulate the admission of air.

April 11th, 1854.

The evening was entirely devoted to the discussion of the papers by Mr. J. Simpson, Jun., and Mr. C. Wye Williams, "*On the management of engine and other furnaces, and the prevention of smoke.*"

An explanation was given, by means of a diagram, of the several divisions of the process, leading to the combustion of the gas in furnaces. The first division gave the mere relative gross bulk of gas and air required for combustion. In the second, the mechanical mixture of the gas and air was described; such mixture, or contact of atoms, being essential to the subsequent chemical union. The third exhibited the several constituents of gas and air,—the former being hydrogen and carbon; the latter, oxygen and nitrogen. The relative volumes of each were given, and it was shewn, that ten volumes of air were absolutely essential to the combustion of one volume of gas. The fourth division shewed the proportions in which those constituents combined. The nature of flame and smoke was examined; shewing, that the intense heat, caused by the combustion of the hydrogen, was the direct cause by which the temperature of the carbon was raised to that of white heat, which produced the luminosity of flame.

This process was illustrated by reference to the mode of producing the intense heat and luminosity required for the oxy-hydrogen microscope. In the latter, the piece of lime, or carbon, on which the heat was projected, was instantly raised to the temperature of extreme luminosity; neither the lime nor carbon, how-

ever, suffering rapid combustion. In the former, the carbon of the gas was raised, by the same means, (the combustion of the hydrogen) to the high temperature, but could not suffer combustion until it was brought into contact, in its turn, with its equivalent of the oxygen of the air.

If, however, that supply of air was not provided, before the carbon lost its high temperature, it returned to its previous and natural state of a black substance, and gave the black character to the products called smoke.

The first important condition was then shewn to be, the providing the required quantity of air. Reference was then made to the area recommended by some authorities as being sufficient to allow the quantity to enter a furnace. It had been considered, that even half a square inch of aperture, for each square foot of furnace grate, was sufficient for the combustion of the fuel. This was, however, stated to be insufficient for practical purposes,—the proper area for admission being from 4 to 6 square inches for each foot of grate, according to the extent of draught and the nature of the coal.

This serious difference was supposed to have been caused by an erroneous calculation of the rate of the current of air entering. For, if half a square inch of area was all that was allowed, the air must have a velocity ten times greater than could be shewn to have been ever attained.

Thus, supposing a furnace to be 4 feet by 2 feet 6 inches, equal to 10 square feet of bar surface, this would effect a combustion of 2 cwt. of coal per hour; and require, for the gas alone, a supply of 10,000 cubic feet per hour; or, for 20 cwt. of the coal, 100,000 cubic feet.

The following comparison of velocities of the entering air for the supply of the gas, gave some idea of the cause of under-rating the required area of admission:—

Air Aperture per square foot of grate.	Velocity of draught per second.	Quantity of air per hour.	Quantity for each ton of coal.
6 square inches	at 5 feet per second	7,500 cubic feet	75,000
6 " "	at 10 " "	15,000 " "	150,000

then, if the area were reduced to half a square inch, it would require a velocity of 80 feet per second, to provide for the admission, within the given time, of the necessary quantity.

By close observation, by means of an ærometer, the velocity of the entering current was estimated at from 8 to 10 feet per second, if the draught was good; and from 5 to 8 feet, when it was but moderate.

Again, it was observed, that by admitting the air through numerous thin films, or divisions, the velocity was necessarily re-

duced, by mere friction, through so many half-inch orifices as were exhibited in the models and drawings on the table.

The mode of admitting the air by numerous small orifices, as practised by Mr. C. Wye Williams, was then considered, and it was shewn, that the great object to be effected was, the division of the air, on its admission to the furnace, so that no more atoms were brought into contact with the atoms of the gas, at any one moment, than were required for their successive union and combustion. If this were the case, combustion and heat would be generated, continuously, as the gas and air came into contact. If, however, the air entered in a body, or even in a film, in larger quantities than could be taken up by the gas, before the temperature was lowered, a refrigeratory effect must be the consequence; smoke would be formed, and fuel would be wasted.

It was asserted, that the phrase "burning smoke," was improper, inasmuch as the smoke did not exist until the gases had left the furnace; this was demonstrated by a diagram, shewing that on distilling coal in a close vessel, and forcing in a small quantity of air, a jet of gas issued, which, on ignition at the orifice, was almost colourless, then merged into flame, and ultimately became opaque smoke.

It was stated, as an argument for the necessity for some stringent measure, with respect to the engine furnaces, in all large towns, that in the last nine years, between 1845 and 1853, eight hundred and one new chimney shafts had been erected in the metropolis, for manufactories, breweries, etc. Some few of them might have been merely rebuilt, after destruction, but the large majority caused additional impurity in the London atmosphere. From 1845 to 1851, the greatest number built, in one year, was ninety-nine; but in 1852, one hundred and eleven were constructed; and in 1853, the number rose to one hundred and twenty-three.

It was contended, that in dealing with the smoke question, too much stress had been laid on the chemical part of the subject; as also, that the statement of its being "impossible to burn smoke" had complicated that which was, in itself, a simple question. All that the public cared about was, that by some simple means the black or brown visible smoke should be prevented from forming, or be consumed, if its formation was incidental to perfect combustion. The air, necessary to perform this, could be admitted anywhere; either through a split bridge,—by the fire-door,—by an infinite number of holes,—between plates with narrow spaces,—or by others arranged like Venetian blinds. Practically, the end could be attained by the mechanical systems of Juckes, Hazeldine, Hall, and others, or by the double furnace boilers of Galloway, Rose, Mc Gavin, and others, or by the systems of Williams, Prideaux, and many others. The objections alleged against all these plans were illustrated; and it was stated, that with ordinary boilers, the admission of air invariably reduced the evaporative power, or caused waste of fuel, unless there was a sharp

draught, and spare boiler power; but that when these latter requisites where secured, the air might be admitted in any way practically found most convenient.

The arrangement proposed by Mr. Prideaux was noticed as the most creditable mechanism yet brought forward, but its neatness was its only recommendation, as it could not improve the draught, nor could it aid in "burning smoke" better than would be done by merely leaving the furnace door ajar. The remarkable coincidence between the arrangement of the parallel plates in Prideaux's fire-door, and that of Williams's well-known and long-practised system, was also noticed. It being stated, as fundamental principles, that in the former system, "the door of the furnace should be double, and the air should pass into the furnace through a series of perforations in the inner plate. By this arrangement three important results are secured.—1. *The heating of the air.*—2. *Its sub-division into minute jets.* (This is the precise principle and operation of Mr. Williams's Argand furnace.)—3. The keeping of the outer surface of the furnace-door comparatively cool, and thereby both economising heat and preventing its radiation outwardly, to the annoyance of the attendants."

Drawings were exhibited of a double flue and double furnace-boiler, whose action was stated to be very satisfactory: the proportion of air space provided in that case was one square inch to each square foot of grate area. The admission of too large quantities of cold air immediately behind the bridge had been found prejudicial, and the system of admitting the supply of air through the perforations in the fire-door was generally preferred. The system of alternate firing, and of having ample boiler space and a good draught, was insisted upon.

It was stated, on behalf of the mechanical methods of firing, that at Price's candle manufactory at Vauxhall, three methods (Jucke's, Hazeldine's, and Hall's) were employed with success. The general principle of a continuous supply of fuel at the front of the fire, by means of moving bars carrying the coal forward, was common to all these apparatus. The air was admitted only from below and between the bars, which were always covered with fuel. The objections urged against these machines were the first cost and their liability to derangement. These, however, were now diminished—particularly with those of Juckes and Hazeldine, to which preference was therefore given in the construction of new furnaces: they were found to produce almost perfect combustion, and to make a great saving of fuel, with other practical advantages.

Two cases were mentioned, as illustrative of the necessity of admitting the air above the incandescent fuel. The first was that of the ventilating furnaces in pits where it was essential to raise to a certain temperature the largest amount of air, by passing it through or over the fuel in a furnace, in such a manner as to render the air as light as possible and not to encumber it with

smoke. The second was that of coke ovens, which were now constructed in pairs and were worked alternately, in such a manner, that the early smoke from one oven mingled with the later development of gases from the other oven;—by this means, the appearance of any opaque smoke was entirely prevented.

In reply to the arguments in the papers, and to some of those used by the speakers, it was urged, that even with the best construction of furnaces, skilful firemen must be employed, and that it was desirable the subject should be divested of all complexity, and should be rendered clear to the meanest capacities. Instances were given of the advantageous employment of mechanical methods of stoking, particularly at the brewery of Messrs. Truman, Hanbury, and Co., where sixteen sets of Juckes' apparatus had been used for several years, and had induced a great saving of fuel, as well as insured undeviating regularity of temperature in the furnaces. The self-acting systems practised by Brunton and by Parkes, many years since, were alluded to, and the reasons for their use being discontinued were given. The alleged defects of these systems were shewn not to exist in the apparatus of Juckes, Hazeldine, and Hall; but that even they were, up to this time, unfit for use in steam vessels, where it had been imagined that mechanical means of firing would have been most advantageous, but where, in reality, the heat in the furnaces was so intense as to destroy any machinery attached to the fire-bars.

The success attendant on Mr. Houldsworth's system for preventing smoke, and on his invention of the metal rod pyrometer, was described.

The general result of the investigation appeared to be, that, although for certain large establishments, the mechanical methods of firing were successful, it could not be expected they would be adopted for every furnace in the smallest manufactory; therefore a good system of mingling a due proportion of atmospheric air with the gases evolved during combustion, was essential, and the method employed by Williams appeared to fulfil the required conditions.

Loysel's Hydrostatic Percolator.

After the meeting, there was exhibited, in the library, a very simple and ingenious apparatus, designed by M. Loysel, for extracting colouring matters from dye-woods, and also for obtaining infusions or extracts of vegetable substances, for medicinal or other purposes.

The principle of action was that of direct hydrostatic pressure, applied by a simple and inexpensive apparatus.

The substance to be operated upon was placed within a cylinder, whose bottom was finely perforated: a similar pierced diaphragm was then placed over it, so as not to produce any pressure. The liquid, either cold or hot, was poured into an upper reservoir, whence it descended, by a centre tube, beneath the lower dia-

phragm, and was forced upwards, by the pressure, through the superposed substance, every particle of which it saturated in its passage,—expelling the air, and carrying before it all the finest portions to the upper strata, against the under side of the upper diaphragm. When a sufficient quantity of liquid had passed, or the infusion was completed, a cock was opened, which permitted the infusion to return from above, by its own specific gravity, through the substance already operated upon,—thus completing the abstraction of any colouring or other matter not previously taken up; and, at the same time, filtering the liquid. By a second and similar process, anything still remaining in the substance could be extracted.

It was practicable, by varying the height of the column, to give any degree of pressure; and, by the application of a lamp, or, in a large apparatus of a coke fire, the temperature of the decoction could be maintained as might be desirable. By another modification, the steam generated in a small boiler regulated the action of the apparatus.

The system was described as being adapted to numerous purposes, and the familiar application of it to making coffee was exhibited. The apparatus consisted of one vase, either of glass, china, or metal, whose cover, on being reversed, formed the reservoir and pressure column, and in a very few minutes, clear strong coffee was produced. It was stated, that, in an apparatus adapted for a large establishment, four gallons of coffee had been made in twenty minutes. The apparatus appeared to possess the merits of great simplicity, of facility of management, and of being easily cleaned; and the infusion of the substance operated upon was perfect.

Scientific Adjudication.

BEFORE THE JUDICIAL COMMITTEE OF THE PRIVY COUNCIL.

Mar. 31*st*, 1854.

CARPENTER'S PATENT.

Present,—The Right Honorables LORD JUSTICE KNIGHT BRUCE, LORD JUSTICE TURNER, SIR EDWARD RYAN, SIR J. DODSON, and SIR JOHN PATTESON.

This was an application on behalf of Captain Edward John Carpenter, R.N., for the extension of his patent for "improvements in the application of machinery for assisting vessels in performing certain evolutions upon the water, especially tacking, veering, propelling, steering, casting or winding, and backing

astern;" dated the 13th day of June, 1840. Mr. Vance appeared in support of the petition.

The grounds on which the patentee urged his claims for a prolongation of the original term of 14 years were as follows:—1st. That he was the original inventor and patentee of the screw propeller in use in all Her Majesty's ships and vessels of war at the present day, and that his invention has been in use for some time in the Royal Navy. 2nd. That the invention was novel at the date of his patent; that it had been duly patented according to law; and that it had been of great utility and value to the Admiralty. 3rd. That the instrument called the "screw propeller" was adopted in the Royal Navy in consequence of the discoveries made by means of Captain Carpenter's experiments, which were conducted at his own expense, and shewn to the Admiralty. 4th. That Captain Carpenter has received no benefit whatever from his invention, although a sum of £20,000 had been paid into a private banker's hands in the city, by the Admiralty, on behalf of all persons who could substantiate a claim to patent-right in respect of the screw propeller used in Her Majesty's service.

The Attorney-General, Sir A. Cockburn, appeared for the Admiralty and the Government, and stated that he should withdraw his opposition to the petition provided Captain Carpenter would consent to the introduction into the grant of extension of a clause, prohibiting him from making any claims on the Admiralty for the future use of his patent; which plan had been followed by other patentees.

Mr. Vance, on behalf of Captain Carpenter, refused to accept the condition which the Attorney-General wished to impose upon him.

The case was argued at great length. The Right Honorable Lowry Corry, one of the Lords of the Admiralty, during the time the invention of the screw propeller was first adopted in the Royal Navy; Sir Edward Parry, Comptroller-General of the Steam Department of the Navy, also at the same period; Mr. Lloyd, Chief Engineer at Somerset House; Mr. Ellis, manufacturer of the screw propeller, Woolwich Dockyard, for Her Majesty's ships; Mr. Longbottom, Secretary of the Royal Polytechnic Institution; Dr. Sayer, Mr. Galloway (engineer), Mr. Durrant, and Captain Carpenter, were examined as witnesses, to prove the petitioner's case.

After hearing the Attorney-General, in opposition to the extension, who contended that the application made by Captain Carpenter to Mr. Currie for the payment of the £20,000, amounted to an admission that he was the arbitrator; and also urged the insertion of the condition giving the Admiralty the benefit of the petitioner's invention—the Lord Justice Knight Bruce, on behalf of the Committee, said as follows:—

JUDGMENT.

"In this case there are great difficulties in the way of the applicant, arising from the limited extent, to which, unless, perhaps by the possible exception of the Royal Navy, the invention, the subject of this patent, has been brought into use, and the very limited endeavours that have been made on the part of the patentee to bring it into use. To which must be added an absence of detailed accounts, or, indeed, of any accounts, such as it has been usual to produce. Their Lordships are of opinion that in the very particular circumstances of the present case each of those apparent objections is answered. And they are particularly struck by the circumstance that the Admiralty—the Government—having had notice of the present application, and appearing here by the Attorney-General, must be taken not only as not contesting the validity of the patent—not only as not contesting the utility and value of the invention, but as, in effect, conceding—as indeed has been proved at the bar—that this very invention is in use at this day, and has for some time been in use in the Royal Navy. There is but one circumstance more which it is necesary to advert to, and that is, the payment of a large sum of money by the Admiralty, as it appears, into the hands of a gentleman, a banker, it seems, in the City, named Currie, for the purpose of application to or among the supposed inventors of the screw. It appears, however, that that sum is not now in the hands of Mr. Currie, but has been paid to various persons, not including the present claimant, who has had no benefit whatever from it—Mr. Currie having, it seems, considered that other parties had a better claim than this gentleman; and, in point of fact, that this gentleman had none.

"Now that circumstance might be of importance if this gentleman had ever accepted Mr. Currie as his judge or arbitrator, or had ever agreed to leave to him the truth or merits of his invention. This gentleman, however, never has done so. Of course he was willing to obtain the £20,000 from Mr. Currie, or from any other quarter that the Admiralty might think fit, if he could obtain it; but his application cannot be construed into a submission to the reference of his rights to the decision of Mr. Currie or any other person.

"His case, therefore, in their Lordships' opinion, is not at all prejudiced by what has taken place in that respect. And under all the particular, and almost unexampled, circumstances of this individual case, their Lordships are of opinion that the ends of justice will be answered by extending this gentleman's patent for a period of six years unconditionally."

LIST OF GRANTS OF PROVISIONAL PROTECTION.

[*Case in which a full Specification has been deposited.*]

828. Henry Kemp, of Creekmoor, Poole, Dorsetshire, for certain improvements in the preparation of wood for planking and sheathing ships and other vessels; also in house, ship, and pier building, railway sleepers, &c., and all other purposes whatsoever where wood is required.—[*Dated April 8th.*]

[*Cases in which a Provisional Specification has been deposited.*]

1853.

2945. James Septimus Cockings, of Birmingham, for improvements in buttons and other dress fastenings; part of which is also applicable for other purposes.—[*Dated December 17th.*]

2971. John Jones, of Glasgow, for improvements in propelling vessels.—[*Dated December 21st.*]

1854.

102. George Fergusson Wilson, of Belmont, Vauxhall, for improvements in treating castor oil, and obtaining products therefrom.—[*Dated January 16th.*]

123. Robert Galloway, of Lambeth, for an improvement in admitting air to furnaces where tubular boilers are employed.—[*Dated January 18th.*]

127. Joel Spiller, of Battersea, for improvements in measuring and mixing, crushing, grinding, and pulverizing wheat and other substances.—[*Dated January 19th.*

399. René Charles Jules Prevet, of Paris, for improvements in treating textile plants for obtaining pulp for manufacturing paper.—[*Dated February 20th.*]

436. Charles Walker, of Bury, for improvements in purifying water for steam-boilers.—[*Dated February 23rd.*]

449. Benjamin Joseph Green, of Birmingham, for improvements in the manufacture of corrugated elastic materials.

453. Edward Power and Thomas Knowles, of Birmingham, for improvements in watches, spring-clocks, and time-pieces.

454. Thomas Forsyth, of Wolverton, for improvements in furnaces.

455. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in machinery for dressing stone,—being a communication.

456. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in turntables for railways,—a communication.

457. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in engines for generating power by means of the expansive force derived from heated air and gases; or by means of the expansive force of liquid carbonic acid and other expansible liquids,—being a communication.

The above bear date February 24th.

458. John Barker, John Andrew, and William Hayes, all of Salford, for improvements in cleansing sheep's wool, mohair, and other animal fibrous substances.

459. Charles William Siemens, of Adelphi Chambers, for improvements in electric telegraphs,—being partly a communication.

461. George Collier, of Halifax, York, for improvements in twisting fringes of shawl and other fabrics.

462. James Keenan, of Paris, for improvements in forming blocks or surfaces for printing,—being a communication.

463. Constant François Bekaert, of Paris, for improvements in linseed oil for painting, called "oxigenated oil,"—being a communication.

464. Charles Lamport, of Workington, for improvements in machinery used in ship-building.

465. James Boydell, of Gloucester-crescent, Regent's Park, for improvements in the manufacture of hurdles and fences.

466. John Elder, of Glasgow, for improvements in marine steam-engines.

467. Alexandre Plantin, of Thayer-street, for improvements in the arrangement and combination of apparatus for stopping and retarding railway trains and carriages.

468. William Edwards Staite, of Manchester, for improvements in the treatment and preparation of madder and munjeet for dyeing and printing.

469. Frederick Westbrook, of Kensington, for improvements in apparatus for facilitating the cleaning of windows.

The above bear date February 25th.

470. Emile Chappuis, of St. Mary Axe, for improved apparatus for the diffusion of light, called "illuminators."

471. Pierre (Peter) Fougerat, of Bordeaux, for improvements in paddle-wheels of steam vessels.

472. John Davie Morries Stirling, of the Larches, near Birmingham, for improvements in the manufacture of tubes and cylinders of steel.

473. Charles de Bussy, of Mornington-road, Regent's-park, for improvements in machinery or apparatus for the amalgamation of gold ores.

474. John Henry Johnson, of Lincoln's-inn-fields, for improvements in harrows,—being a communication.

475. Richard Archibald Brooman, of Fleet-street, for an improvement in the manufacture of tin-foils or sheets,—being a communication.

476. John Morrell, of Bradford, Yorkshire, for stopping the tap of any vessel containing oil, treacle, or any other liquid, as soon as the quantity required of such oil, treacle, or other liquid has been taken therefrom; such quantity being ascertained by weight.

The above bear date February 27th.

477. Leontide Aglaëe Pallegoix, and Alexandre Louïs Bellange, both of Paris, for improvements in treating wheat and other grain.
478. Theobald Denny, of Strasbourg, for improvements in engraving.
479. Frederick Samson Thomas, of Cornhill, for a new rifle carriage.
480. Ellis Marsden and John Marsden, of Liverpool, for improvements in pumps.
481. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in the means of admitting the steam or other motive power agent to, and exhausting it from, the cylinders of oscillating engines,—being a communication.
482. John Henry Rehè, of Bayswater, for improvements in machinery or apparatus for mixing, washing, crushing, bruising, reducing, or comminuting various substances.
483. William Simpson, of Tovil Upper Mills, near Maidstone, for an improvement in employing, in the manufacture of soap, a product obtained when manufacturing pulp from straw.
484. Colin Mather, of Salford Iron Works, Manchester, for an improvement in valves for reducing the pressure of steam.
485. André Louis Mallet, of Rue de la Pepinière, Paris, for improvements in apparatus to destroy the effects of shocks.
486. William Patten, of Old Fish-street, London, for improvements in valves and apparatus for supplying water.
487. James Medwin, of the Blackfriars-road, for an improvement in water-gauges for steam boilers.
488. Edward Clarence Shepard, of Trafalgar-square, for improvements in decomposing water by electric currents,—being a communication.
489. John Thomas Way, of Holles-street, Cavendish-square, and John Manwaring Paine, of Farnham, for an improvement in the manufacture of gas, and also of a charred product.
490. Thomas James Johnson, of Booth-street, Spitalfields, for improvements in apparatns for roasting malt.
491. John Soden Holbeche, of Sutton Coldfield, for improvements in the construction of invalid bedsteads; which said improvements are also applicable for couches, chairs, and reclining seats or beds for invalid carriages.
492. John Henry Johnson, of Lincoln's-inn-fields, for an improved apparatus for facilitating the acquirement of the art of reading,—being a communication.

The above bear date February 28th.

493. Henry Gilbert, of Suffolk-street, Pall-mall East, for improvements in connecting and supporting artificial teeth.
494. Jean Toussaint Cortin, of New Compton-street, Soho-square, for soling shoes and boots with leather combined with gutta-percha and wood, sewed with metallic wire.

495. Wilhelm Ehrhardt, of Birmingham, for improvements in the construction of ordnance and fire-arms, and in loading the same.
496. Charles Hargrove, of Birmingham, for an improvement or improvements in steam-boiler and other furnaces.
497. William Joseph Curtis, of Birchin-lane, for an improved levigating machine.
498. Thomas Henry Ewbank, of South-square, Gray's-inn, for improvements in the manufacture of terry or looped fabrics, and in machinery for producing the same.
501. John Sibley and Thomas Sibley, both of Ashton-under-Lyne, for improvements in machinery or apparatus for cutting discs or circles out of plates, or sheets, of metal or other substances.
502. William and Joseph Clibran, of Manchester, for certain improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.
503. Michel Napoleon Illakowicz, of Maddox-street, for improvements in picture frames.
505. John Simon Holland, of Woolwich, for improvements in locks.
506. Thomas Metcalfe, of High-street, Camden Town, for improvements in the manufacture of portable and folding bedsteads, chairs, seats, tables, and cots.

The above bear date March 1st.

507. John Parry the younger, of Liverpool, for improvements in mills or machinery for grinding or cutting bones, wood, or other like substances,—being a communication.
508. Richard Vinkeles Houssart, of Dunstan-street, Kingsland-road, and Robert Houston, of Skinner-street, Snow-hill, for improvements in vessels to contain fluids.
509. Hugh Ellis and John Ellis, both of Salford, for improvements in machinery or apparatus for stretching and finishing woven fabrics.
510. Andrew Barclay, of Kilmarnock, for improvements in lubricating shafts and revolving metallic surfaces.
511. Andrew Barclay, of Kilmarnock, for improvements in arranging and working mining engines and machinery.
512. John Currie, of Glasgow, for improvements in the treatment and grinding of grain, and the products thereof.
513. Thomas Dawson, of King's Arms-yard, for improvements in umbrellas and parasols.
514. John Tann, of Minerva-terrace, Hackney-road, for improvements in the construction of locks.

The above bear date March 2nd.

516. Timothy Yates and Rufus Yates, of Bury, for improvements in looms.

517. John Augustin Boyle, of Alfred-place, Bedford-square, for crushing or reducing to powder, pulp, or wash, any matter.
518. Lorenzo Tindall, of Scarborough, for improvements in churns.
520. George Spill, of Old Farm House, Stepney, for improvements in the application of waterproof hatbands to the manufacture of hats.
521. William Edward Newton, of the Office for Patents, 66, Chancery-lane, for improved machinery for measuring and folding cloth and other fabrics, or manufactured materials,—being a communication.
522. Caleb Bloomer, of West Bromwich, for improvements in spikes and bolts.
523. Joseph Bour, of the Mauritius, for improvements in evaporating saccharine liquids.
524. William Vaughan, of Stockport, and John Scattergood, of Heaton Norris, for certain improvements in machinery, apparatus, or implements for weaving.

The above bear date March 3rd.

525. Ellis Rowland, of Manchester, for certain improvements in machinery or apparatus for manufacturing bricks or tiles from clay or other plastic materials.
526. Charles Nightingale, of Wardour-street, for improvements in the mode of curling horse-hair and other materials.
528. Richard Madeley, of Birmingham, for an improvement or improvements in the joints and framing of metallic and other bedsteads, chairs, sofas, couches, and such other articles as are or may be used for sitting, lying, and reclining upon.
529. Felix Abate, of George-street, Hampstead-road, for improvements in printing on and ornamenting surfaces.
530. Herman Dirs Mertens, of Margate, for improvements in working steam-engine valves,—being a communication.
531. Francis Herbert Wenham, of Effra Vale Lodge, Brixton, for an improved hydraulic machine for registering or indicating the flow or quantity of fluids, and obtaining motive power.
532. John Knox Stuart, of Glasgow, for improvements in hats, and other coverings for the head.

The above bear date March 4th.

534. John Warhurst, of Hollingworth, for improvements in steam-boilers.
535. James Galloway, of Bolton-le-Moors, for improvements in the construction of cocks, taps, and valves.
537. Samuel Austin Chapin, of Trafalgar-square, for an improved mode of purifying smoke produced by the combustion of coal or other substances; and for condensing and collecting the solid and other matters contained in smoke and vapour arising from the combustion, smelting, burning, or roasting of fuel and other substances,—being a communication.

538. Thierry Hubert de Nivelles, of Foley-place, for certain apparatus for separating metallic from earthy and other substances, and for classifying metallic substances according to their specific gravities.

539. John Ronald, of Patrick Bank, near Paisley, for improvements in printing yarns and threads.

540. Pierre Amable de Saint Simon Sicard, of Paris, for improvements in purifying sea and other water.

541. John Richard Morton, of Oxford-street, for improvements in shades and reflectors applicable to certain descriptions of lamps, lanterns, or chandeliers.

542. Benjamin Brokenshar, of Saint Austell, for an improved amalgamator.

The above bear date March 6th.

543. Jeremiah Johnson, of Church-street, Leatherhead, for a new stop for railway and other carriages.

544. William Clay, of Liverpool, for an improved mode of manufacturing axles, shafting, and other like solid articles which present a round figure in cross section.

545. Frederick Rixon, of Cockspur-street, for an improved apparatus for lowering and disengaging ships' boats.

546. George Chant, of Stoke-sub-Hamdon, Somerset, for a fan-parasol or sun-shade.

The above bear date March 7th.

547. Thomas Dunn, of the Windsor Bridge Iron Works, Pendleton, for improvements in machinery and apparatus for moving engines and carriages from one line of rails to another, and for turning them.

548. Henry Bernoulli Barlow, of Manchester, for improvements in waterproofing and finishing textile fabrics and yarns,—being a communication.

550. George Beardsley, of Nottingham, for improvements in round or circular machinery for the manufacture of textile and looped fabrics.

551. Richard Boyell, of Derby-road, Nottingham, for a portable safety-guard, for the prevention of fire; applicable alike both to public and private buildings; and which said portable safety-guard is also applicable as a reviver.

552. John Dickinson Brunton, of Truro, for improvements in wind-guards or chimney-tops, for promoting ventilation in fire-place flües.

553. William Isaac Cookson, of Newcastle-on-Tyne, for an improvement in the reduction of lead ores.

555. William Septimus Losh, of Wreay Syke, Cumberland, for certain means of decoloring resins.

556. Giuseppe Devincenzi, of Grosvenor-street, for an improvement in producing ornamented and figured surfaces, and surfaces for printing from.

557. John Aitken, of Longsight, near Manchester, for improvements in obtaining motive power.
558. William Warne, of St. Austell, for improvements in tubular steam-boilers or generators.
559. Joseph Brown, of Leadenhall-street, for an improved method of swinging furniture and other articles for travelling by sea or land, and other purposes.
560. John Blair, of Irvine, Ayrshire, N. B., for certain improvements in beds or couches, and other articles of furniture.

The above bear date March 8th.

561. William Walter Good, of Moorgate-street, for improvements in machines applicable for thrashing and winnowing.
563. George Thomas Selby, of Smethwick, for improvements in machinery for the manufacture of tubes and pipes, and for shaping tubular and circular metal articles.
564. John Henry Johnson, of Lincoln's-inn-fields, for improvements in machinery or apparatus for finishing fabrics,—being a communication.
565. William Beckett Johnson, of Manchester, for improvements in strengthening the ends of tubes to be attached to boiler-plates, or to be used for other such purposes.
566. Peter Armand le Comte de Fontainemoreau, of South-street, for an improved reaping-machine,—being a communication.
567. William Young, of Queen-street, Cheapside, for improvements in lamps.
568. John Holley Swan, of Glasgow, for improvements in the tuyeres of blast and other furnaces and fires.
569. François Eugène Sulpice Garnier, of Paris, for improvements in machinery for preparing flax and other textile materials.
570. Hippolyte Lamy, of Paris, for certain improvements in preserving animal and vegetable substances.

The above bear date March 9th.

572. Emile Alfred Desrousseaux, of Roubaix, France, for improvements in looms for weaving.
573. William Peace, of Haigh, near Wigan, for improvements in machinery for measuring, indicating, and registering the flow of air, gas, and other liquids, and for governing the speed of steam or other engines.
574. Simeon Mosely, of Hull, for improvements in the manufacture of artificial palates for the adaptation of artificial teeth.
575. James Lawrence, of Leeds, for an improved rotatory engine.
576. Peter Armand Le Comte de Fontainemoreau, of South-street, for improvements in the manufacture of candles,—being a communication.
577. John Buchanan, of Leamington Priors, for an improvement in communicating motion to or from the ordinary crank or an excentric.

578. William Day, of Beverley, Yorkshire, for improvements in the construction of covered carts and other like vehicles, which may be used as dwelling-places or travelling-houses.
579. Francis Whitehead and William Whitehead, both of Crayford, for improvements in raising, forcing, and supplying water and other liquids.
580. William Mill, of Hunter's-lane, Birmingham, for improvements in ink-stands or ink-holders.
581. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in the manufacture of raised printing surfaces,—being a communication.
582. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in the mode of purifying coal-gas, and of obtaining, during the manufacture of the gas, a certain purifying material, and in apparatus to be used in purifying gas,—being a communication.
583. Désiré Parfait Lefèvre, of Paris, for an improved railway-brake.
584. Zephirin Boitteux, of Epinal, France, for certain improvements in the machinery for sculpturing and carving.
586. John Patterson, of Beverley, Yorkshire, for improvements in machines for washing cloth and similar materials.
587. John Henry Johnson, of Lincoln's-inn-fields, for improvements in the manufacture of hollow jewellery,—being a communication.

The above bear date March 10*th.*

589. John Maynard, of Drury-lane, for an improvement in strings for piano-fortes and other stringed musical instruments.
590. Willoughby Theobald Monzani, of St. James's-terrace, Bermondsey, for improvements in bedsteads, and packing-cases or boxes to contain the same and other articles.
591. James Wright, of Manchester, for improvements in machinery or apparatus for "curing" and "liquoring" sugar by centrifugal force without acidifying or injuring the syrup,—being a communication.
592. William Tytherleigh, of Birmingham, for improvements in the manufacture of tea-kettles.
593. William Symington, of Gracechurch-street, for improvements in apparatus for heating air by means of steam.
595. John Henry Johnson, of Lincoln's-inn-fields, for improvements in lighting,—being a communication.
596. James Sparrow, jun., of Tettenhall-road, Wolverhampton, for improvements in shears for cutting iron or other metals.
597. John Buchanan, of Leamington Priors, for improvements in the propellers and apparatus used for propelling vessels.

The above bear date March 11*th.*

598. Laurence Whitaker, John Diggle, and George Howarth, all of Haslingden, for certain improvements in machinery or apparatus for spinning cotton and other fibrous materials.

599. John Henry Johnson, of Lincoln's-inn-fields, for an elastic breeching apparatus for cannons,—being a communication.
600. Benjamin Latchford, of St. Martin's-lane (Upper), for improvements in saddlery or harness.
601. John Glenny, of the Strand, for a portable camp bed.
602. Edward Haeffely, of Radcliffe, for an improved mordaunt, to be used in printing and dyeing textile materials and fabrics; applicable also to the process of bleaching.
603. Edward Haeffely, of Radcliffe, for improvements in the manufacture of stannates of soda, potash, and ammonia.
604. James Wright, of Park-street, Kennington, for improvements in the construction of furnaces for the purpose of consuming, more effectually than heretofore, the smoke contained therein.
605. John Walker, of the City-road, for improvements in raising stamps employed for crushing, and rams or monkeys employed in pile-driving and other like operations.
606. George Hopper, of Houghton-le-Spring Iron Works, for improvements in pins for railway chairs.
607. John Henry Johnson, of Lincoln's-inn-fields, for improvements in sewing-machines,—being a communication.
608. Auguste Edouard Loradoux Bellford, and Persius Ristori, both of Castle-street, for improvements in inflating life-belts, buoys, and articles of a similar nature,—a communication.

The above bear date March 13th.

609. Frederick Russell, of Clarence-gardens, Regent's-park, for improvements in apparatus for clearing obstructions on railways.
610. Albert Wentworth Conner, of Crooked-lane, Cannon-street, for improvements in the apparatus used for moulding bricks and lumps.
611. John Holley Swan, of Glasgow, for improvements in drying bricks, tiles, and other articles made of brick-earth.
612. Johnson Hands, of Epsom, for improvements in kilns.
613. James Woodford, of Hatton-garden, for a smoke-consuming rotary grate.

The above bear date March 14th.

614. Richard Archibald Brooman, of Fleet-street, for improvements in sector presses,—being a communication.
615. Peter Armand le Comte de Fontainemoreau, of South-street, for improvements in producing waterproof stuffs,—being a communication.
617. Thomas Kaye, of Huddersfield, for improvements in the manufacture of gas, and in the apparatus employed therein.
618. Thomas Stephen Holt and Charles Herbert Holt, both of Manchester, for improvements in steam-boilers.
619. Joseph Pimlott Oates, of Lichfield, for improvements in the manufacture of bricks, tiles, pipes, and such other articles as are or may be made of clay.

620. Laurence Whitaker and Greenwood Lyons, both of Haslingden, for certain improvements in grinding or setting the main cylinder of carding-engines, used for carding cotton and other fibrous materials.

621. John Houston, jun., of Glasgow, for improvements in working steam-boilers, and in apparatus connected therewith.

622. Alfred Trueman, of Swansea, for an improved furnace for the calcination of copper ores and other mineral substances.

623. William Weatherley and William Jordan, both of Chartham, near Canterbury, for improvements in steam-boilers.

624. Antoine Edouard Paschal Le Gros, of Paris, for improvements in preserving timber, and, generally, all kinds of wood.

625. Thomas William Keates, of Chatham-place, Blackfriars, for improvements in the means of distilling turpentine and other resinous matters, and in manufacturing boiled or drying oils.

626. George Pead and Cornelius Wyatt, both of Conduit-street, Regent-street, for an instrument for readily ascertaining the wear of the bearings of railway-carriages.

627. Miles Binns and John Pollard, both of Bradford, Yorkshire, for improvements in apparatus for combing wool, cotton, silk, flax, or other fibrous substances.

The above bear date March 15*th.*

628. Cyprien Poisson and Louis Jacques Martin, both of Paris, for improvements in printing fabrics,—being partly a communication.

629. Robert Weare, of Princes-road, Plumstead Common, for improvements in the construction of galvanic batteries, and in apparatus connected therewith.

630. Donald Bethune, of Toronto, for improvements in the construction of vessels propelled by steam.

631. Frederick William Emerson, of Trereiffe Chemical Works, near Penzance, for improvements in machinery for pulverising, washing, and amalgamating quartz, and matters containing gold and silver.

632. James Cavanah, of Liverpool, for improvements in sails for navigable vessels, and in the apparatus for working them.

633. John Lilley, of Birkenhead, for a new material, suitable for spinning either alone or combined with other fibres, and suitable to the manufacture of pulp; also certain machinery employed in the preparation thereof.

634. James Garth Marshall and Peter Fairbairn, both of Leeds, for improvements in machinery for combing flax, tow, wool, hair, and other vegetable or animal fibres.

The above bear date March 16*th.*

635. John Gerard, of Guernsey, for machinery for cutting and stamping soap.

636. William Holt, of Bradford, Yorkshire, for improvements in reed-pipes for organs.

637. Rice Williams Harris and Thomas Patstone, both of Birmingham, for an improvement or improvements in shades or glasses for gas and other lamps.
639. Thomas Walker Scott, of South Devon-place, Plymouth, for improvements in the preparation or manufacture of Devonian limestone.
640. Alexander Hendry, of Port Glasgow, for an improvement in heating bakers' ovens.
641. George Harman Barth, of Mornington-crescent, for improvements in the mode of supplying and administering gases for the alleviation and cure of certain diseases.
642. Thomas Bassnett, of Liverpool, for an improved mode of compensating for the deviation of the needle of ships' compasses, occasioned by local attraction.
643. James Hughes, of James-street, Bethnal-green-road, for an improved mode of operating the Jacquard apparatus of looms employed in figure weaving.

The above bear date March 17th.

644. George Waide Reynolds, of Birmingham, for a new or improved fabric to be used in the manufacture of stays or corsets.
645. John Hyde and John Harper, both of Stockport, for improvements in the construction of spindles and flyers for roving and slubbing frames.
646. John Hick, of the Soho Iron Works, Bolton-le-Moors, for improvements in apparatus for heating the cylinders of steam-engines.
647. William Thorne, of Barnstaple, for improvements in reducing metallic ores.
648. William Dantec, of New Quay, Liverpool, for improvements in purifying water.
649. Percival Moses Parsons, of Duke-street, Adelphi, for certain improvements in the construction of the permanent way of railways.

The above bear date March 18th.

650. Paul Rapsey Hodge, of Moorgate-street, for improvements in reducing metallic ores.
651. Edouard de Mars, of Paris, for certain improvements in windlasses or capstans,—being a communication.
652. Robert Tempest, James Tomlinson, and Henry Spencer, all of Rochdale, for certain improvements in the method of cleansing sheep's-wool, and in the machinery or apparatus connected therewith.
653. John Bird, jun., of Manchester, for improvements in the manufacture of silk into threads required for woven fabrics, for sewing, and for other purposes, and in machinery to be used for these purposes.
654. Henry Moore, of the Junction Foundry, Hull, for an improved template for facilitating the building of iron ships and vessels.

656. François Loret-Vermeersch, of Malines, Belgium, for improvements in looms for weaving.
657. Joseph Horton, of Shoreditch, and Richard Jenkin Polglase, of Stepney, for improvements in the construction of ships, boilers, girders, tanks, gasometers, and other like structures or vessels.
659. William Locock Webb, of New Broad-street, for improvements in pulverizing, washing, and amalgamating quartz, and matters containing gold and other metals.
660. John Longbottom, of Merrion-street, Leeds, for improvements in combining atmospheric air with hydro-carbons, for the purposes of light and heat,—being a communication.
661. Joseph Perkins, of Kennington, for improvements in metallurgy, especially applicable to the production of type and ornamental forms.
662. Joseph Perkins, of Kennington, for improvements in working metals, especially adapted for producing surfaces for blocks for printing calicoes, silks, paper, and other fabrics.
663. James Young, of East Smithfield, for improvements in brewing.
664. Richard Archibald Brooman, of Fleet-street, for improvements in sewing machines,—being a communication.

The above bear date March 20th.

665. William Stevens and William Stevens, jun., both of Birmingham, for a new or improved machinery for grinding and polishing lenses.
666. Jean Daniel Pfeiffer, of Rue Princesse, Paris, for improvements in bookbinding,—being a communication.
667. James Hansor, of the Wandsworth-road, for improvements in the manufacture of illuminating gas.
668. John Polson, of Paisley, for improvements in the manufacture of starch.

The above bear date March 21st.

669. Richard Roberts and George Coppock, both of Heaton Norris, for certain improvements in looms for weaving.
670. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in japanning leather and other fabrics, —being a communication.
671. Edward Keirby, of Radcliffe-close, Manchester, for an improved reed for looms.
672. John Sheringham, of Edwardes-square, Kensington, for improvements in the construction of kettles, and other like domestic utensils, and in the means of supporting or retaining the same in proper position when in use.
673. William East, of Goswell-road, for an improved ventilator.
674. George Sterry, of Worcester, for improvements in the manufacture of mouldings, suitable for cornices, picture frames, architectural decorations, and other like purposes.

675. Henry Maderson, of Clapham, and George William Warren, of Lambeth, for an improved safety-guard for gun-locks.
676. Thomas Simons Watson, of West Strand, for an improved railway traverser.
677. John Healey, John Foster, and John Lowe, all of Bolton-le-Moors, for improvements in certain parts of machines used for preparing, slubbing, and roving cotton and other fibrous materials.
678. John Horsfall Robinson, of Hebden-bridge, Yorkshire, for improvements in steam-boilers.
679. William Dinsley Skelton, of Leeds, for an improvement in preparing flax for spinning.
680. Robert Owen White, of Swanscombe, for improvements in the manufacture of Portland cement.

The above bear date March 22nd.

681. Bright Eagland, of Leigh, Lancashire, for improvements in the manufacture of woven fabrics, and the machinery or apparatus employed therein.
682. Emanuel Désiré Coëz, of St. Denis (France), for improvements in the preparation of certain substances for the purpose of printing and dyeing fibrous materials and fabrics.
683. William Vitruvius Greenwood and John Saxby, both of Brighton, for improvements in railway signal lamps.
684. Frederic Seiler, of Interlaken, Switzerland, for improvements in the manufacture and construction of solid and veneered, tesselated, and other shaped woodwork, suitable for floorings, buildings, works of art, and other purposes.
685. Laurence Whitaker and Doctor Ashworth, both of Haslingden, for certain improvements in power-looms for weaving.
687. Alfred Lister, of Birmingham, for certain improvements in the manufacture of metallic castings.
688. James Newman, of Birmingham, for improvements in the manufacture of metallic tubes.
689. Stephen Holman, of Colney Hatch, for improvements in machinery for raising and forcing fluids; part of which improvements is also applicable to the guiding of piston-rods generally, and other rods.

The above bear date March 23rd.

690. Richard Montgomery, of New York, for a new and useful improvement in corrugated metals, and in machinery for producing the same.
691. Herbert Room and William Morton, both of Birmingham, for a new or improved method of ornamenting metallic bedsteads, and such other articles of furniture as are or may be made of metal.
692. Richard Doidge and John Cloves, both of Birmingham, for an improvement or improvements in the manufacture of

rolls to be used in shaping and impressing sweetmeats and plastic materials generally.

693. Benjamin Fothergill and William Weild, both of Manchester, for improvements in obtaining and preparing the fibres of plantain penguin, and other vegetable substances, for manufacturing purposes.

694. Samuel Humphreys, of Green-street, Leicester-square, for improved apparatus for the heating or distilling of fatty, oily, and resinous matters,—being a communication.

The above bear date March 24th.

696. William Wood, of Monkhill House, near Pontefract, for improvements in machinery or apparatus for the manufacture of carpets and other fabrics.

697. Edward Bagot, of Llanelly, for improvements in the manufacture of rails for railways.

698. James Lochhead, of Kennington, and Robert Passenger, of Union-street, Southwark, for improvements in the manufacture of glass or other vitrified substances.

699. James Robertson, of Glasgow, for improvements in lifting or transporting heavy bodies.

700. Walter Neilson, of Glasgow, for improvements in marine steam machinery.

The above bear date March 25th.

New Patents.

Sealed under Patent Law Amendment Act, 1853.

2181. Ferdinand Potts.
2184. Henry Needham.
2190. James Baldwin.
2191. F. C. Calvert.
2198. Charles Alexander.
2200. Robert Varvill.
2210. Joseph Ellisdon.
2213. F. F. Clossman.
2217. J. Bury and W. Green.
2231. François J. Raux.
2235. P. A. Le Comte de Fontainemoreau.
2237. J. H. Johnson.
2244. Edward Davies.
2248. Samuel Murland.
2255. W. J. Thompson.
2273. John Wright.
2274. James T. Wilson.
2275. H. J. Betjeman.
2277. S. L. Worth and A. D. V. Canavan.
2279. John Mason.
2280. W. L. Tizard.
2281. John Milner.
2282. Julius Schönemann.
2293. J. Bullough, J. Walmsley, and D. Whittaker.
2296. Joseph Porter.
2299. Thomas Lambert.
2304. Henry Kraut.
2309. William Potts.
2320. R. A. Brooman.
2329. James Worrall.
2330. Charles Rowley.
2336. John Francis Porter.
2338. George Frederick Goble.
2339. J. Morrison and D. Hurn.
2343. E. J. Maumené.
2344. R. W. Waithman.
2346. George Bradley.
2347. J. Higgins and T. S. Whitworth.

2353. Wm. M. Campbell.
2357. Sir J. S. Lillie.
2366 A. Mc Lean and W. F. Rae.
2368. M. A. Davy and A. Taylor.
2369. William Palmer.
2372. The Hon. F. W. Cadogan.
2373. A. E. L. Bellford.
2376. F. S. Thomas.
2378. J. H. Johnson.
2379. B. Royle and W. M. Chell.
2380. A. E. L. Bellford.
2384. Alexander Mac Dougall.
2390. J. M. Dunlop.
2395. J. P. De la Fons.
2404. Emory Rider.
2408. J. W. Child and W. Wilson.
2409. John Norton.
2411. Robert Shaw.
2415. James Barton.
2418. Alexis Dussuc.
2419. William Binns.
2427. William Melville.
2428. Jonathan Woofenden.
2449. Thomas Stainton.
2457. J. B. Verdun.
2461. Joseph Beasley, Jun.
2463. Alfred Vincent Newton.
2473. E. J. Hughes.
2494. Richard Archibald Brooman.
2521. John Crowley.
2527. Henry Tylor.
2528. James Chesterman.
5263. William Racster.
2564. William Edward Newton.
2570. J. B. Nicklin.
2578. Edwin Kesterton.
2592. G. F. Parratt.
2608. S Sturm.
2761. A. E. L. Bellford.
2771. J. C. Ramsden.
2777. L. A. Michel.
2780. J. A. Manning.
2834. William Edward Gaine.
2839. Alfred Vincent Newton.
2867. Frederick Osbourn.
2900. Benjamin Fullwood.
2956. J. L. Clark.
3009. John Barnes.
3019. J. W. Crossley.
3022. A. V. Newton.

1854.

8. Henry Lee Corlett.
10. David Kennedy.
25. William Rigby.
35. J. D. M. Stirling.
38. W. E. Newton.
40. Jesse Ross.
47. R. A. Tilghman.
58. A. Mitchell.
70. Marcel Vetillart.
88. Arthur Parsey.
120. William Thomas.
142. R. A. Smith & A. Mc Dougall.
150. C. M. T. Du Motay.
155. C. J. Edwards.
158. William Darling.
160. Thomas Robinson.
165. Henry Seebohm.
166. John Getty.
182. S. C. Lister.
186. W. E. Newton.
193. Thomas Wicksteed.
194. Thomas Wicksteed.
197. Sydney Smith.
198. Samuel Slack Stellard.
205. Thomas Thurlby.
206. William Palmer.
208. Joseph Atkinson.
212. J. L. Clark.
215. Donald Bethune.
226. Richard Garrett.
227. John Kershaw.
231. A. M. Fatio and F. Verdeil.
245. J. Jackson & G. M. Hantler.
252. F. H. Wenham.
253. A. Robinson.
264. James Stevens.
265. J. H. Glassford.
269. C. H. Collette.
278. A. V. Newton.
288. T. and W. Hemsley.
291. Walter Neilson.
295. John Elce.
296. Edward Poitiers.
301. Abraham Pope.
302. James Taylor, J. Brown, and J. Brown.
304. A. V. Newton.
327. Jacques Rives.
332. William Whiteley.
339. John Rogers.
347. James Cox.
350. John Greenwood.
390. William Morrison.
393. Edward Loysel.
460. F. W. A. de Fabeck.

*** *For the full titles of these Patents, the reader is referred to the corresponding numbers in the List of Grants of Provisional Protections.*

CELESTIAL PHENOMENA for May, 1854.

D.	H.	M.	
1			Clock after the ☉ 3m. 1s.
	—		☽ rises 6h. 40m. M.
	—		☽ passes mer. 3h. 23m. A.
	—		☽ sets Morn.
	23		☽ in Apogee
2	11	48	♅ in conj. with the ☉
4	4	35	Ceres in □ with the ☉
5			Clock after the ☉ 3m. 28s.
	—		☽ rises 10h. 31m. M.
	—		☽ passes mer. 4h. 40m. A.
	—		☽ sets 2h. 10m. M.
	9	30	☽ in □ or first quarter
6			Occul. *i* Leonis, im. 7h. 41m. em. 8h. 46m.
	5	16	♂ in conj. with the ☽ diff. of dec. 3. 38. S.
	5	36	☿ greatest hel. lat. S.
8	1	37	♃'s first sat. will im.
8	20	39	♀ greatest elong. 46. 2. W.
9			Occul. 48 Virginis, im. 12h. 10m. em. 13h. 15m.
		36	Vesta in conj. with ♂ diff. of dec. 7. 6. N.
10			Clock after the ☉ 3m. 48s.
	—		☽ rises 4h. 53m. A.
	—		☽ passes mer. 10h. 31m. A.
	—		☽ sets 3h. 37m. M.
12			☽ eclipsed, invis. at Greenwich
	3	36	Ecliptic oppo. or ○ full moon
	—		Occul. 41 Libræ, im. 7h. 34m. em. 8h. 10m.
	—		Occul. *k* Libræ, im. 8h. 58m. em. 9h. 45m.
13	23	0	☽ in Perigee
	—		Occul. 18 Ophiuchi, im. 12h. 19m. em. 12h. 58m.
14			Pallas stationary
	2	8	♃'s second sat. will im.
15			Clock after the ☉ 3m. 54s.
	—		☽ rises 11h. 54m. A.
	—		☽ passes mer. 2h. 20m. M.
	—		☽ sets 5h. 54m. M.
	3	31	♃'s first sat. will im.
	12	0	♃ stationary
16			Mercury, R. A., 2h. 36m. dec. 13. 40. N.
	—		Venus, R. A., 0h. 36m. dec. 2. 19. N.
	—		Mars, R. A., 10h. 30m. dec. 11. 5. N.
	—		Vesta, R. A., 10h. 27m. dec. 18. 25. N.

D.	H.	M.	
16			Juno, R. A., 11h. 8m. dec. 9. 13. N.
	—		Pallas, R. A., 19h. 50m. dec. 17. 54. N.
	—		Ceres, R. A., 21h. 22m. dec. 22. 43. S.
	—		Jupiter, R. A., 19h. 58m. dec. 20. 53. S.
	—		Saturn, R. A., 4h. 8m. dec. 19. 19. N.
	—		Uranus, R. A., 2h. 44m. dec. 15. 30. N.
	—		Mercury passes mer. 23h. 4m.
	—		Venus passes mer. 21h. 1m.
	—		Mars passes mer. 6h. 54m.
	—		Jupiter passes mer. 16h. 20m.
	—		Saturn passes mer. 0h. 33m.
	—		Uranus passes mer. 23h. 5m.
	13	41	♃ in conj. with the ☽ diff. of dec. 4. 13. N.
17	1	39	☿ in conj. with ♅ diff. of dec. 1. 4. S.
19	6	33	☽ in □ or last quarter.
20			Clock after the ☉ 3m. 46s.
	—		☽ rises 2h. 11m. M.
	—		☽ passes mer. 7h. 11m. M.
	—		☽ sets 0h. 23m. M.
21	0	46	♃'s third sat. will em.
22	7	35	♀ in conj. with the ☽ diff. of dec. 2. 6. N
23	11	53	♃'s first sat. will im.
24	13	53	♅ in conj. with the ☽ diff. of dec. 1. 19. N.
25			Clock after the ☉ 3m. 24s.
	—		☽ rises 3h. 25m. M.
	—		☽ passes mer. 10h. 53m. M.
	—		☽ sets 6h. 37m. A.
	5	29	☿ in the ascending node
	7	36	Vesta in □ with the ☉
26			☉ eclipsed, invis. at Greenwich.
	2	3	☿ in conj. with the ☽ diff. of dec. 0. 6. N.
	8	47	Ecliptic conj. or ● new moon.
	9	32	♄ in conj. with the ☉
	9	34	♄ in conj. with the ☽ diff. of dec. 2. 4. S.
27	21	25	☿ in conj. with ♄ diff. of dec. 2. 8. N.
28	14		☿ in sup. conj. with the ☉
29	12		☽ in Apogee.
	19	10	☿ in Perihelion.
31	1	47	♃'s first sat. will im.

J. LEWTHWAITE, Rotherhithe.

THE

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CONJOINED SERIES.

No. CCLXX.

RECENT PATENTS.

To Thomas Slater, *of Somers-place, New-road, optician, and* Joseph John William Watson, *of Old Kent-road, Doctor of Philosophy, for improvements in the application of electricity to illuminating purposes.*—[Sealed 4th October, 1852.]

The first part of this invention consists in using horizontal levers attached rigidly to a piece or pieces of soft iron serving as the armature of an induced magnet, made magnetic by the same current which, by its rupture in the space between the poles, affords the light, and by which a vertical rod or beam, or other contrivance for holding the electrode, is gripped, and held in a fixed position,—but which rod is free to slide downwards, or take any other course obligatory on the effect of gravity or the elasticity of a spring; the said levers serving the further purpose, by their forming the armatures of an induced magnet, of elevating or giving other direct motion to the rod when gripped by them. The simplicity of the above arrangement is said to permit of its modification in an infinity of ways; but the use of levers attached to the armature of an induced magnet or magnets, to act in the manner and for the purposes described, is especially claimed. For all lamps, in which the apparatus is likely to receive rough usage, and where an ornamental appearance and beauty of design are not required, the following arrangement is preferred. The current enters by the binding-screw *a*, fig. 1, Plate XI., and passes up the body of the lamp *b*, through the magnet *c, c*, which is secured to a bracket fixed to the pillar *b*. A wire c^1, is connected with the rod *d*, in order to ensure better contact. This rod is suspended at *e*, by the chain *f*, and weight

g, which works within the tubular support *b*, but which is by no means necessary for the successful working of the lamp. The armatures *h*, *h*, are attached to brass levers h^1, h^1, which are fitted with eyes through which the rod *d*, passes freely when induction ceases; but when the current passes through the magnet, the outer extremities of the compound levers h^1, h^1, are raised, and their eyes simultaneously grasp the rod *d*, which is thus held at a proper elevation: but when the current is broken, the levers assume a horizontal position and allow the rod to drop down,—which effects a re-establishment of contact between the electrodes. A series of antifriction pulleys are fitted at *i*, to surround the rod, and allow it to descend freely. The lower portion of the lamp corresponds to that shewn at fig. 8, which differs somewhat in form and principle from that described above, mainly by the induced magnet being situate in the base of the lamp, and by the armature being connected with the electrode-carriers by a system of levers. *a*, *a*, fig. 8, is an electro-magnet (which may be constructed in the form hereinafter described, and shewn in detail at fig. 9), fixed in the base of the lamp, and rendered magnetic by the wire which enters at a^1; the other end of the magnet being in connection with the base of the lamp. The armature *b*, of the magnet is attached to the lower extremity of the rod *c*, which is attached at its upper end to one extremity of the lever *d*. This lever works on the fixed centre *e*, and is terminated by a fork *f*. The helical spring *g*, serves to keep the end d^1, of the lever elevated when the magnet is not in action. This fork *f*, embraces the collar *h*, which consists of two semi-cylindrical pieces hinged together at *i*, and made to grasp the vertical rod *j*, by the action of the ascent of the fork on the conical sides of the collar. The rod *j*, is fitted with a socket *k*, and tightening screw, for holding the electrode *l*, which should be fixed rigidly to it. The lower electrode l^1, is inserted into the socket *m*. This socket is fitted on to the top of the main stand *n*, which also carries a binding screw, by which it is connected with the other pole of the battery. The black portions in fig. 9, represent the insulated points of the apparatus. Two flexible wires *o*, connect the top of the lamp with the upper end of the rod *j*, to which they are secured by a binding screw *p*. As the correct working of the lamp depends on the adjustment of the arc or striking distance between the poles during the working of the lamp, an arrangement, shewn at *q*, is introduced; which consists of a boss, capable of turning round in a grooved ledge encircling the upper portion of the pillar, through which

passes the rod attached to the forked lever *d*, and the armature of the magnet *b*. The inner portion of the boss is grooved with a female screw thread, into which works a male screw. The turning of the boss raises the male screw (which consists merely of a tube grooved on the outside), and, carrying the lever, causes the armature of the magnet either to recede or approach the poles, and hence decreases or increases the inductive power. Moreover, the portion of the pillar above the boss being slotted, to allow of the lever passing through, restrains the play of the lever to certain limits. These two circumstances combined serve as the required means of adjustment of the striking distance, as will be obvious without further description. The action of the lower pole of the lamp is as follows:—The current which makes the electro-magnet *a*, makes also the electro-magnet *r*, before it passes to the general body of the lamp. The electro-magnet *r*, attracts the armature *s*, which is attached to a curved lever moving horizontally on the axis *t*, but kept from the magnet, during the time induction is not taking place, by the spring *u*. At the other extremity of the lever is a moveable tooth *v*, but which, after turning the ratchet wheel *x*, (into which it fits, by the induction of the magnet), is always made to resume its original position by the bow-spring v^1. *y*, is a screw which is made to rise, and so elevate *w*, the electrode holder, by means of the rotation of the wheel *x*. It will be clear, from this description of the apparatus, that the same action which results from the magnetic operation of *a*, will induce a similar consequence in the action of *r*, with the exception that in the latter case, the motion is a rising one instead of a descending one. Moreover, by the simultaneous action of both poles, the great desideratum of preserving the light in one place is successfully accomplished.

A modification of the above-described mode of raising the lower electrode is effected by an arrangement in which, instead of a screw travelling within a tube, a long rack is used, into which fits a tooth, attached to a lever of the same kind and construction as the last described, but working vertically instead of horizontally; the induction of the magnet being downwards instead of laterally. The action of this arrangement is very simple, and consists merely in the keeper at one end of the lever being attracted, and so causing, on every such occasion, the opposite and toothed end to raise the rack a tooth when the inductive action takes place. The action of this lamp is as follows:—The electric current, on its passage through the magnet *a*, causes the armature *b*, to be attracted; thereby

drawing down the end d^1, of the lever *d*, and consequently raising the collar *h*, and rod *j*: the electrodes are thus retained at a proper distance asunder, so long as a sufficient amount of attraction exists between the magnet and armature to keep the latter down. Should any non-conducting material obstruct the passage of the electricity through the arc, the induction of the magnet instantly ceases; and the helical spring *g*, coming into action, forces up the end of the lever *d*, and, at the same time, the descent of the forked end of the lever releases the grasp of the collar upon the rod *j*, which consequently slides down and re-establishes contact between the electrodes; the requisite arc being instantly re-formed by the attraction of the armature, as hereinbefore described. If, as in other arrangements for producing the electric light, the contact be made by two or more points on the electrode (which points are temporarily removed to admit of the electrode sliding down as it burns away), the light will for such time go out, and a spark passing between the points of the jaws will fuse them: and hence, in time, from the coat of oxide formed, the lamp will cease to be of any use at all, since the principle does not admit of good conduction being always kept up. The contact in this lamp is always the same and continuous,—since the descent of the rod, to which the electrode is attached, requires simply a diminution of the friction exercised on the rod by the lever and collar apparatus hereinbefore described. This action is accompanied by no diminution of the light. In addition to the forms described, it is preferred, for public lights (and, indeed, for all cases of illumination where the light has to be sustained for a long time), to use several electrodes, and also separate lights, in the same lamp; but in all such cases the same principles are adhered to. In arranging several electrodes, great care must be taken to preserve them insulated one from the other, and to derive their electricity by separate wires. Several small electrodes forming the positive poles are occasionally opposed to one larger electrode, forming the compound negative pole of the several batteries. It is found that by combining several electrodes or sources of light in the same lamp, and bringing them near together, the chances of flickering, going out, sparks, &c., are reduced, and the general illuminative effect is rendered more constant.

Fig. 10, is a partial section and elevation of an arrangement for raising the lower electrode *a*. This is effected by the screw *b*, which is secured to the pulley *c*. A traversing nut *d*, works in a slot in the side of the cylindrical case *e*, and is raised or lowered by the screw *b*. The electrode *a*, is fitted into a

socket in the top of the nut, and passes through the piece *f*, which serves to guide it in its ascent. This arrangement, which must be worked by hand, is substituted for the magnetic arrangement in the bottom of the lamp in fig. 8, in all cases where the lamps are used in situations where personal attendance is practicable and easily attainable.

The next portion of this invention relates to electrical governors, indicators, and alarums, and other minor apparatus connected therewith. Fig. 2, shews a partial section of an arrangement for indicating any variation in the current, and also, to a certain extent, a means of measuring its intensity, termed the "electric governor or indicator." *a*, is the base of the apparatus, to which is attached the single magnet *b*. A helical spring *c*, is interposed between the magnet and armature *d*. A rack *e*, is attached to the armature, which works into the pinion *f*, on the arbor of the indicator *g*. A wire *h*, connects the armature *d*, with the arbor of the indicator, and another wire *i*, passes thence to the outer pole of the battery. The action is as follows:—The current, on passing through the magnet, attracts the armature, drawing it down, more or less, according to the strength of the current, and, consequently, turning the pinion, and with it the indicator *g*, which shews, on a graduated dial, the strength of the current. The helical spring is for the purpose of raising the armature when the attraction diminishes. Fig. 3, is an alarum or means of indicating at the battery depôt, or at any other place through which the electric mains may pass, any sudden or partial cessation in the continuity of the current. It may be termed, generally, an alarum. *a*, is an electro-magnet, made by the same current of electricity that supplies the lamp or other apparatus. *b*, is the armature, attached to a lever *c*, which is bent at right angles, and carries a detent *d*, which actuates the ratchet-wheel *e*. Attached to the centre of the ratchet-wheel is the radial arm *f*. *g*, is a toothed lever, having a hammer *i*, which plays within the bell *h*, and is constrained to the position represented at fig. 3, by a coiled spring in the axle on which it works. *k*, is a weight attached to a cord passing round a drum attached to the back of the ratchet-wheel *e*. The action of the alarum is as follows:—When, from any failure in the current, the armature *b*, ceases to be attracted by the electro-magnet, it will fall by its own weight, and release the detent tooth *d*: the weight *k*, then descending, will cause the ratchet-wheel to rotate, and so turn the radial arm *f*; which, striking the lever *g*, will effect the ringing of the bell *h*. The re-establishment of the current

will instantly arrest the descent of the weight, and, consequently, the ringing of the alarum.

In order to increase or decrease the amount of light in the lamp, when the illuminating apparatus is large, or to adjust a powerful battery to a delicate lamp, the current is checked, as it enters, by causing it to pass through iron wires, of different thicknesses, imbedded in pipe-clay, or alumina, or asbestos,—the connection being made by means of a handle of peculiar construction; which, by sliding on an axis on which it turns, over the top of the pipe-clay bed, with the surface of which the iron wires are arranged parallel and flush, the current is passed through any one of the wires at the pleasure of the operator; thereby diminishing or increasing the intensity of the light given off at the points of the electrodes. Fig. 4, is an end view, and fig. 5, a corresponding plan of this apparatus. *a*, is a lever, composed of ivory, or any other good non-conducting material, working on the fixed centre *b*, and turned in a horizontal plane by the small handle *c*, and having a small metal stud *d*, at the moveable extremity. *e*, *f*, *g*, *h*, *i*, are iron wires, of graduated thicknesses, resting in a bed of pipe-clay *j*, which is fixed in the wooden stand *k*. The terminals of the wires are united by the cross piece of metal *l*, which is fitted with a set-screw *m*, for the attachment of the wire *n*. The action of the instrument is as follows:—The lever being turned, so as to bring the stud *d*, on to any particular wire, the current, passing in at *l*, travels by *d*, along the upper surface of the lever *a*, (which is of brass) and thence, by the binding-screw forming the fixed centre of the lever, to the lamp. Now, if the current be found too strong, all that is necessary is to turn the lever, so as to bring the metal stud on to a wire of smaller dimensions, and so, by the increased resistance, retard the surplus power. As it will be evident that the power of a battery must, after a certain time of action, decline, and, as such an event would seriously affect what might be taking place in the apparatus to which the electricity might be passing, such as the lamp, this difficulty is obviated by using a reserve battery, the power from which can be instantaneously transferred by the following contrivance, shewn in plan at fig. 6:—*a*, is a disc of wood, which may be firmly attached to any suitable support. b, b^1, b^{11}, b^{111}, are metallic plates embedded in the disc, all on the same level, and carrying binding-screws x, x^1, x^{11}, x^{111}. In the centre of the disc is a boss *g*, which is extended above into a handle *f*,—by turning which, the two metallic arms e, e^1, which are attached to the boss *g*, but insulated from each

other by the introduction of a piece of ivory or other good non-conducting material, are moved round. On the arms e, e^1, are two binding-screws h, h^1. The action of the apparatus is as follows:—The battery in action and the battery in reserve are attached by wires to the four metallic plates b, b^1, b^{11}, b^{111}, by means of the binding-screws: thus, to b, b^1, is attached the battery in action, and to b, b^1, accordingly, are turned the metallic arms e, e^1: the current then passes, by wires attached by the binding-screws on e, e^1, direct to the lamp or other apparatus. Now, supposing the power of this battery to be declining, from the length of time the light has been burning, without causing any cessation in the production of the light, all that is necessary is to turn, by means of the handle f, the metallic arms e, e^1, to the metallic plates b^{11}, b^{111}, by sliding over, and on to which the reserve battery is immediately brought into play, and the electricity, from the fresh source, instantaneously applied. The battery is then at liberty to be replenished and prepared for taking the place of the reserved battery, when it shall have been exhausted. By such means the light may be maintained, with sufficient length of electrodes, for a week in action without cessation. It is often desirable suddenly to change the poles, when, either from want of homogeneity in the electrodes, or from any accidental cause, one electrode has consumed much quicker than the other. This is effected by what is termed the "brake,"—a small apparatus, consisting of a sliding plate of brass or other metal; which being slid over four buttons of brass (each button forming the terminal of either the battery poles or the lamp poles), the current is made to proceed through the negative pole of the lamp or the positive pole, as the case may be. Let a, and b, fig. 7, be the positive and negative poles of a galvanic battery, and a^1, b^1, the poles of the lamp; then let it be required to change the poles of the lamp:—x, x^1, x^{11}, x^{111}, are metallic plates, well insulated from one another, and arranged in a line in a wooden stand; l, l^1, is a slide, constructed of wood and with two metallic ends, and moved by the handle c. Now, when the ends of l, l^1, are on the plates x, x^{11}, then the current, setting out from the positive pole of the battery a, circulates by the wire 1, to the positive pole of the lamp a^1, by the wire n, and returns by n^1, to x^{11}, and thence, by the wire 2, to the negative pole of the battery b. To change the poles of the lamp the slide is slidden back to x^1, x^{111}, and then the current from a, circulates by 3, to x^{111}, thence to b^1, and by 4, back from x^1, to b, by which b^1, becomes positive, and a^1, negative; in other words, the poles of the lamp are reversed.

Occasionally electro-magnets, formed as follows, are employed:—A copper band, 4 inches broad and about 25 feet long, is insulated by being coated with calico. A portion, 3 inches long, of this piece is then bent back, and between it and the main piece is inserted a plate of soft iron: 2 inches of the band is next bent back in the opposite direction, and a similar plate of soft iron inserted as before. The rendering of this dry pile magnetic is effected by passing the current in the direction indicated by the arrows in fig. 9, by which double and opposite poles are obtained in the same plate. In this figure *a*, is a brass plate; *b*, b^1, are the copper plates; and *x*, x^1, are the wires, bringing the current which renders the pile or flat helix magnetic. The black spaces represent the iron plates: *c*, is the keeper. It will be obvious to any practical man that the hereinbefore-described arrangements are equally applicable to signalizing purposes.

Another portion of this invention relates to the use of two or more electrodes in the same or different planes, and the arrangement of such electrodes so as to produce more than one point of illumination in the same lamp, at the same time. These improvements are intended to render the electrode homogeneous, moderately hard, of perfect conductibility, capable of suffering moderate and perfectly uniform convection during ignition, and non-absorbtive of moisture. These improvements are effected in the following manner:—70 parts of finely-powdered coke are well boiled in nitro-muriatic acid, to remove any metallic or earthy impurities with which it might be contaminated, and afterwards washed with caustic potash, and mixed with 20 parts of red charcoal, or, as it is termed by the French, "charbon rouge," or animal charcoal, and 5 parts of gas pitch, with 4 parts of finely-powdered Newcastle baking-coal, and 1 part of china clay: the whole is then carefully heated in a mould of appropriate construction. The patentees generally prepare a mass of about 1 foot 6 inches broad, and 3 feet deep, at a time; the gases which are produced by distillation being allowed to escape by an eduction-pipe. The time occupied for the preparation of the mass is preferred to be from nine to twelve hours. The heat is applied very gradually for the first two hours; after which the mass is tightly compressed, by the ends of the mould being made to approximate by means of a screw. After the mass is withdrawn from the mould and cooled, if the operation has been properly conducted, it may be sawn into pieces of the desired size, perfectly homogeneous in their structure.

It is found that good electrodes, giving a steady achromatic light, may be prepared by the following process, from well-burnt beech charcoal, selected from the small wood, or, as they are technically termed, "loppings:"—A piece of the charcoal, sawn into the required size for the electrodes, is steeped in a solution of caustic lime for about a quarter of an hour; it is then taken out, dried, and placed into a crucible containing powdered charcoal; and a lid being firmly and closely luted on to the crucible, it is exposed to a white heat for about half an hour; it is then taken out after the crucible has cooled, placed in a saturated solution of alum, and, after having soaked for about half an hour, it is dried and again brought to a white heat as before. It is again removed and plunged, whilst hot, into treacle or any thick saccharine or carbonaceous fluid, and, finally, once more ignited. If the operation has been properly conducted, it is now very hard, quite free from any traces of ligneous structure, a perfect conductor, and burns slowly, equally, and noiselessly when forming the terminal of the voltaic arc. The electrodes, which are formed by the first-described process, burn at the rate of about a quarter of an inch per hour on an average; so that an electrode a foot in length would burn between twenty-four and twenty-eight hours. They consume evenly, and are but little effected by the wind. Before using, the electrodes are pointed by a fine file, in order that they may wear equally after being first ignited. For electrodes which are intended to be used in lamps where the arc will be great, and the current passing very powerful, instead of alum, soluble glass, prepared in the following manner, is used:—15 parts of powdered quartz or very fine sand are fused with 10 parts of potash and 1 part of charcoal in a crucible. When the fusing is complete, the crucible is uncovered, and the mass taken out and treated with cold water, by which the extraneous particles of carbon and foreign salts are removed. The residue is then treated with hot water, and thereby entirely dissolved. The electrodes are immersed in this from five to ten minutes, whilst the solution is hot. The other operations for preparing the electrodes are the same as in the preceding case. The object of adding the non-conducting substances, alum, china clay, soluble glass, and caustic potash, is to prevent the excessive convection which the otherwise great conductibility of the carbon would occasion, and thereby render the continuity and perfection of the light impossible, from the excrescences formed about the poles.

The patentees claim, First,—the general construction and

arrangement of electric lamps, as hereinbefore described. Second,—the application and use of a conical collar constructed of two semi-conical pieces of metal, hinged at one of their extremities, and acting as a grip upon a solid rod carrying the upper electrode of an electric lamp, as hereinbefore described. Third,—the application and use of a lever forked at one of its extremities to act upon the conical collar in the manner and for the purposes hereinbefore described. Fourth, —the connection with one extremity of the aforesaid lever of the armature of an induced magnet, to act in the manner and for the purposes hereinbefore described. Fifth,—the attachment of a spring, in the manner hereinbefore described, to the aforesaid lever, to cause the forked extremity of the lever to leave the sides of the conical collar during the momentary cessation of the induction of the magnet, in the manner hereinbefore described. Sixth,—the regulation of the striking distance by the slot and travelling screw-boss, shewn in fig. 10, in the manner and for the purposes hereinbefore described. Seventh,—the construction and use of the screw for raising the lower electrode, in the manner and for the purposes hereinbefore described, and shewn in fig. 8. Eighth,—the use and construction of the horizontal levers forming the armature of an induced magnet or magnets, for gripping the electrode holder, in the manner and for the purposes hereinbefore described. Ninth,—the system or mode of raising the lower electrode, in the manner and for the purposes hereinbefore described and shewn in fig. 8. Tenth,—the use and application of an electro-magnet, for turning the ratchet-wheel, giving motion to the travelling screw holding the lower electrode, in the manner hereinbefore described. Eleventh, —the system or mode of applying electric currents so as to cause a more equable consumption of the electrodes, in the manner and for the purposes hereinbefore described. Twelfth, —the making of the two electro-magnets inductive at the same time, and by the same current that supplies the light. Thirteenth,—the use of helices of copper or other wire in lieu of electro-magnets, in the manner and for the purposes hereinbefore described. Fourteenth,—the application and use of several electrodes in the same lamp, as arranged in the manner hereinbefore described. Fifteenth,—the construction of electro-magnets, in the manner hereinbefore described, and shewn in fig. 9. Sixteenth,—the construction of the governor and indicator, for indicating the variation and strength of the current, in the manner hereinbefore described, and shewn in fig. 2. Seventeenth,—the use and construc-

of an ordinary drawing-frame, with the improved apparatus applied thereto. *a, a,* is the roller beam; *b, b,* is the roller stand; and *c, c,* are the drawing-rollers; *d, d,* are the calendering-rollers; *e, e,* is a lever, capable of moving upon a suitable fulcrum at *f,* and resting upon the ends of the top drawing-rollers. The lever *e, e,* is connected to another lever *g, g,* by means of a link *h, h,* in such a manner as to be capable of being readily disconnected when required for doffing, &c. The lever *g, g,* is fixed upon a shaft *i, i,* upon which a lever *k, k,* is also fixed; and to the other end of this lever *k, k,* a catch *l, l,* is connected. *m, m,* is a lever mounted upon a centre at *n,* and held in the position shewn in the figure, by the catch *l, l;* and *o, o,* are the ordinary revolving wings, fixed upon a shaft *p, p,* to which one half of a catch-box, having inclined teeth, is attached, as usual. It will be evident that, if the sliver should break and begin to lap round any of the drawing-rollers *c, c,* the consequent increasing diameter of the roller will cause it (or its corresponding top roller, if the lapping takes place upon the lower roller) to rise, and by raising the lever *e, e,* (which rests upon the top of the same) release the catch *l, l,* and allow the lever *m, m,* to fall into a perpendicular position; which lever *m, m,* coming into contact with the revolving wings *o, o,* will stop the revolution of the shaft *p, p;* thus throwing the catch-box out of gear, and, consequently, stopping the machine. The result will be the same in the event of a larger quantity of cotton or other fibrous material attempting to pass between the drawing-rollers. If the calendering-rollers *d, d,* become choked, either by the lapping of the sliver or from any other cause, the increased resistance preventing the spur-wheels *q, q,* (represented by the dotted circles) from turning, will cause the front drawing-rollers to rise, and, by raising the said lever *e, e,* to stop the machine. By the use or employment of this improved apparatus, not only is a great economy of material effected, by preventing the formation of waste, but also the breaking of the gearing, &c., hitherto so frequently caused by the "lapping" and choking of the calendering-rollers, is obviated; as the machine cannot possibly get into motion again until the catches *l, l,* are put into gear by means of the lever or handle *r, r.*

The patentees claim a lever resting upon the ends of the drawing-rollers, and connected to any suitable disengaging apparatus, in such a manner that the rising of the said lever, either by the lapping of the rollers or otherwise, shall stop the evolutions of the machine.

To George Hanson, *of Huddersfield, plumber, and* David Chadwick, *of Salford, gent., for improvements in apparatus for measuring gas, water, and other fluids; which improvements are also applicable for obtaining motive power.*—[Sealed 31st March, 1853.]

This invention consists in the use of a flexible tube or bag, into one end of which gas, water, or other fluid to be measured, enters from the main or other source, and there, exerting its force against a roller or rollers placed upon the tube or bag, causes the roller or rollers to revolve and discharge from the other end thereof the fluid which had previously entered. Each revolution, therefore, will represent a certain amount of fluid which has passed through the apparatus; and this amount may be registered by means of any ordinary counting apparatus connected to the roller or rollers. If used for obtaining motive power, motion may be communicated in any ordinary manner.

In Plate XI., figs. 1, and 2, are diagrams shewing the principle on which meters for measuring water are proposed to be constructed. Let *a*, represent a circular flattened tube of India-rubber or other flexible material,—the two ends *b*, *c*, being open; and upon this let there be placed a roller, so that the line *d*, *e*, may represent that part of its periphery which rests upon the bag or tube; the roller turning upon a centre at *f*. By such an arrangement, two chambers A, B, will be formed,—the one having an inlet at *b*, and the other an outlet at *c*. If a fluid be now passed through the orifice *b*, with sufficient pressure, the roller will be caused to revolve around the centre *f*, in the direction of the arrow, enlarging the chamber A, which will continue to be filled by the fluid. Upon the line *d*, *e*, having arrived coincident with that of the aperture *c*, that orifice will be closed, and the whole tube be charged with fluid; but the pressure being continued, the roller will be forced onward beyond the end *c*, of the tube, which will then be at liberty to open and discharge its contents; the roller passing onward to be propelled as before. One revolution, therefore, represents the amount of fluid, or nearly so, necessary to fill the tube; and if such rotations, as they follow each other, be registered by any ordinary wheel work, the quantity of fluid discharged may be ascertained.

Fig. 3, is a cross section of a water meter constructed on this principle. The tube or bag, formed of India-rubber or other flexible material, is shewn at *a*, *a*, resting upon a metal plate *b*, which is slightly concave, and cut from its outer circumference towards the centre. One end, thus formed, is

bent upwards, so as to constitute a spiral surface, the object of which is to bring the discharge end *c*, of the tube *a*, above that of the inlet end *d*: the former of these opens direct into a metal casing *e*, which encloses the whole apparatus. The metal plate *b*, rests upon a division plate *f*; and its helical form is supported by occasional pieces, situate between the two. The end of the tube *a*, at which the fluid enters, is closed water tight,—the passage for the fluid being formed by an orifice *g*, cut through the under fold of the bag or tube. Through this orifice a metal socket passes, provided with a flange, which rests upon the interior surface of the tube, and upon which it is drawn down so as to make a tight joint by a hollow screw-nut *h*. The tube or bag is kept in its central position by means of a ring of metal *q*, screwed to the plate *b*. The roller which rests upon the tube is shewn at *i*, provided with an axis placed within a slot formed in an upright shaft *j*; in which slot it is retained by two pins or screws, but remains at liberty to play up or down in the slot. The shaft *j*, turns on a step *k*, at bottom, and within a cross rail *l*, at top; and upon it is mounted a circular disc *m*, the surface of which is forced upon the roller *i*, by a spiral spring *n*, which abuts against the cross rail *l*. The object of this arrangement is to secure a pressure on the tube sufficient to prevent the fluid in the bag from passing under the roller. The fluid entering through the pipe *o*, passes into the lower chamber *e**, of the casing, and thence through a wire gauze *r*, into the tube or bag *a*, through the orifice *g*,—causing the roller, as before described in reference to the diagrams, figs. 1, and 2, to revolve; the water admitted at the previous revolution escaping by the open end *c*, into the casing *e*, from which it may be withdrawn by the pipe *p*. The revolutions of the shaft *j*, may be registered by any ordinary counting apparatus.

The apparatus above described as a water-meter may be arranged for a gas-meter; it should, however, be of lighter construction, and formed of suitable materials for resisting the chemical action of the substance to be measured; the pressure of the gas being equalized by any known or suitable arrangement of regulating apparatus. In employing this apparatus as a motive power engine, the only difference necessary will be to construct the machine of proper strength: motion in this instance may be taken from the shaft *j*, in any ordinary manner.

The patentees claim the employment of a flexible tube or bag, capable of being divided into inlet and outlet chambers by a surface travelling thereon, for the purposes above set forth.

To Richard Archibald Brooman, *of Fleet-street, for improvements in grinding and pulverizing gums, gum-resins, and other drugs, and articles of similar character,—being a communication.*—[Sealed 12th April, 1853.]

This invention consists of improvements in mills commonly used for grinding gums, gum-resins, and other drugs, or articles of similar character, whereby such substances may not only be disintegrated with great rapidity, but the required impalpable powder may be produced at one operation; thus obviating the necessity of submitting the matter to the usual additional process known as "dusting."

The improved mill is represented in figs. 1 and 2, Plate XI., and is constructed as follows:—*a*, is a circular bed stone made of granite or other suitable material, and rising in the centre in the form of a cone. This conical form is employed for the purpose of enabling the advancing edge of the muller, which has a plane surface, to pass over or mount upon the material submitted, instead of pushing that away, as would be the case were both surfaces plane. The bed stone, thus formed, is firmly fixed upon a suitable frame, and surrounded with a curb of wood *b*, as usual in the class of mills known as "chasers." A shaft *c*, passes through a suitable opening in the bed stone, and is made to revolve by appropriate connection with any first motor. Upon the bed stone one or more "mullers" *d*, composed of granite or other suitable material, are placed. The face in contact with the bed stone is a circular plane, of a diameter rather less than the radius of the bed stone, and the muller is diminished in size towards the upper end, in the manner shewn in fig. 1, in order that it may not come in contact with the curb. In the centre of the upper end of the muller a hole *e*, is drilled, extending downward nearly to the face, and at right angles with it. In this hole a spindle is firmly fixed, and upon this the muller revolves, in the ends of an arm *f*, extending from the shaft *c*. The arm is placed a short distance above the muller, in order that when the feed happens to be too abundant, the muller may be permitted to rise over it. Upon one of the arms *f*, is placed a lever, standing in a vertical position, or nearly so, as seen at *g*. It has play upon a pin g^1; and upon the head of the spindle is an adjustable screw, the head of which works into a cranked arm of the lever *g*, as shewn. The lever strikes against a pin projecting from a vibrating rod *k*,—imparting to that rod a motion similar to that of the usual damsel or beater employed for regulating the feed in mills of this class. The curb may be of any height suitable to the

substance to be reduced; and the whole is enclosed in a tight casing.

The operation of the mill is as follows:—Rotary motion being given to the shaft, the mullers are driven round by the spindles and caused to bear upon the bed stone only on the line of a radius; the bed receding from the face of the muller on both sides in a curve, as seen in fig. 2, which is a section on the line *x*, *x*, of fig. 1; and as, by reason of the conical form of the bed, the flat surface of the muller is more nearly in contact with the bed on the outer portion, as at *m*, than on the inner, at *n*, the onward motion of the muller causes it to revolve upon the spindle. A simple forward movement would have the effect only of rubbing the substances introduced between the stones; but, as a point on the periphery of the face of the muller will describe a hypocycloid upon the material on the bed stone, the material will then be also ground or cut. Although in the mills in common use the particles of many substances, as rhubarb, &c., are obtained light enough to rise over the curb, they are yet susceptible of further disintegration by the simple operation of the "duster." In this machine the muller is constantly assuming a new line of bearing on the conical surface of the bed stone, and the substances between are reduced by a rotating grinding motion on the line of contact.

If the material be supplied so rapidly as to accumulate beneath the muller, that will rise,—the spindle moving upward through the arm *f*, and causing the upper end of the lever *g*, to be thrown toward the centre; in this position it will pass the pin on the vibrating rod, without touching it, and thus the feed would cease for a time.

The patentee claims the construction of a mill in which the grinding surfaces shall consist of a plane or planes operating upon a cone, as set forth; also, the lever *g*, in combination with the muller, for the purpose of regulating the feed;—the whole being constructed and operating substantially as set forth.

To Auguste Edouard Loradoux Bellford, *of Castle-street, Holborn, for improvements in sawing-machines for slitting or resawing plank and other timber by means of circular saws,—being a communication.*—[Sealed 2nd May, 1853.]

This invention relates to the circular saw, which presents, in some respects, important advantages over the reciprocating saw, but yet has not been heretofore successfully applied to

re-sawing or slitting planks and other timber, except very narrow timber, for the reason that, when such saw is made of the requisite diameter for wide timber, it will buckle, unless made so thick as to be wasteful of the timber and of the power applied to drive it. This difficulty has been overcome when sawing veneers, by making the saw of a convex form on that face of it over which the veneer passes as it is cut from the log; but this method cannot be used for what is called re-sawing or slitting planks or timber, for the reason that from the thickness of the two parts they are too stiff and rigid to pass over the thick part of the saw, when the additional thickness is made all on one face; and even if it were made equally on both faces, the binding on the saw-plate would be so great as to present a serious resistance to its rotation. The object of this invention is so to construct and apply the circular saw to the slitting or re-sawing of planks or other timber, as to avoid all the objections above pointed out in employing a circular saw with both faces convex or swelled, so that it shall present a thin cutting edge, to avoid waste of the timber and reduce the resistance in cutting, and be gradually thicker towards the shaft, to give it the requisite thickness to prevent buckling, and insure a steady motion at the periphery; when this is combined with a fixed bevilled gauge placed near the periphery of the saw, on that side of the shaft opposite to where the planks are presented to the teeth; so that the said gauge shall separate or spread the two parts of the planks as they are being cut, and prevent them from binding against the two faces of the saw.

In Plate XII., fig. 1, is a plan of a sawing-machine constructed according to this invention; fig. 2, is a side elevation of the same; fig. 3, is a transverse vertical section taken through the axis of the saw; fig. 4, is a horizontal section of the bevilled gauge; and fig. 5, is a section through the axis of a saw of the same form, but differently constructed to that shewn in the other figures.

a, represents a circular saw mounted upon an appropriate shaft *b*, which runs in bearings in the frame *c*. The shaft is provided with a pulley *d*, to receive a belt from any prime mover. The saw is made convex on both sides, so as to be of considerable thickness towards the shaft, and thin at or near its periphery. The extra thickness or convexity may be produced in a solid plate, as shewn in fig. 3, or by securing a plano-convex plate on each side of a saw constructed in the usual way. Behind the saw, and firmly attached to the frame, is the guide or gauge *e*, made of metal in the form of

the segment of such a circle that when placed near the periphery of the saw it shall be concentric, or nearly so, therewith. The edge of it next the saw is wedge-shaped (as shewn at fig. 5), for the purpose of so spreading the plank as to prevent binding or rubbing against the edge of the saw. The plank f^2, is presented to the edge of the saw by two sets of rollers; the one set f, f, f^1, constituting the guide or bed rollers. These rollers are mounted in a frame g, which can slide laterally in the main frame, and be adjusted to determine the thickness of one part of the plank to be slit, by means of a set screw g^1. One of these rollers, f^1, has its lower journal connected by a rod k, with a vertical shaft j, in the lower part of the frame, by means of two universal joints; so that the roller may be changed in position, and still receive motion from the shaft j. This shaft has a spur-wheel l, working into another spur-wheel m, of equal diameter, on another shaft n, which carries a bevil-wheel p, working into a corresponding bevil-wheel o, on the shaft of a band-wheel q, over which passes a band r, from a pulley on the end of one of a pair of conical pulleys which receive motion by a band s, from the shaft of the saw. In this way the feed-motion for the plank is obtained, and the conical pulleys admit of varying the feed in the usual manner. By the side of the rollers just described, is the other set t, t, t^1, two of which are mounted in one frame u, and the third in another frame v; and the two frames are connected by a strong spring w, with an adjusting screw x, by means of which the two sets of rollers can be moved nearer together or further apart, to suit the thickness of the timber to be slit or re-sawed; the spring giving the requisite play to the rollers, so as to enable them to adapt themselves to the varying thickness of the plank as it passes through; whilst, at the same time, its tension is sufficient to bend any warps out of the plank, and ensure its presentation to the edge of the saw in a proper manner; so that one part of the plank, when it is slit, shall be of an uniform thickness. The roller t^1, of this set is connected with the shaft n, by means of a rod y, and two universal joints; so that one of the rollers of each set, taken together, act as feed rollers to propel the plank towards the saw: this gearing may be dispensed with, if thought desirable, and the plank be fed forward by other known mechanical means, such as an endless chain. The patentee remarks that when the two geared rollers are used for the purpose of feeding the plank, one or both of them should be fluted.

He claims the employment of a circular saw with both

faces convex, whether the said convexity is produced in a solid plate, or made by securing other plates to the sides of a saw constructed in the usual way, when this is combined with the guide or gauge *e*, for spreading apart the plank or other timber, to prevent the binding of the saw.

To Samuel Wright, *of Church-street, Shoreditch, for making a gas, steam, air, or liquid safety-tap.*—[Sealed 19th May, 1853.]

This invention consists in so making safety-taps, that the valve or plug opens against the pressure, and that their action is unerring, whether applied as self-acting taps or otherwise.

In Plate XI., fig. 1, represents, in sectional elevation, one of the improved safety-taps constructed as a self-acting supply tap. *e*, is the barrel of tap, in which a globular swell *f*, is formed, and in which the valve *h*, is placed. The other part of the barrel *g*, is screwed into the globe *f*, and the end forms the valve-seat *i*. The valve *h*, is mounted on a pin *k*, which slides in a cross-bar *l*, and projects through the side of the exit-chamber, where it is jointed at *m*, to the ball-lever *n*, having its fulcrum at *o*. The valve *h*, is faced with India-rubber, leather, or other suitable material, to render it water-tight, and is indicated as being open or shut by the positions shewn in the dotted lines. The valve being mounted on the horizontal rod *k*, maintains its true position to its seat, and, when open, ensures a clear water-way through the valve aperture. A small washer *p*, of India-rubber or leather, presses up to the orifice in the discharge, where the rod *k*, enters and prevents any escape of water at that opening when the valve is full open. The ball lever is weighted so that it just floats; the weight of the ball being required to open the valve against the pressure of the water, when the water subsides in the receiving vessel. On the water again rising in the receiver, the ball rises and closes the valve; in which it is also assisted by the pressure of liquid in the containing vessel, from which the supply is discharged; and thus a certainty of self-action is ensured.

Fig. 2, is a section of a hand-tap for drawing off liquids under pressure, and so arranged that pressure may exist on both sides of the valve. The globular chamber-valve *f*, valve-seat *i*, and valve-rod *k*, are all similar to that before described, but with the valve-stem *k*, in a vertical position, in which it

is sustained by a cross-bar *r*. In addition to the pressure of the fluid in the supply, the valve *h*, is forced downwards on its seat *i*, by a spring *s*, on the rod *k*; the spring *s*, abutting against the cross-bar *r*, and the enlarged head of stem, between which it is compressed so as to give downward force for the purpose. The improvements in the make of this valve are in the lever action by which it is actuated. *t*, is the hand-lever, which is mounted on a fulcrum-pin *u*, fixed in a collar *v*, which collar is pressed into its seat by a screw-cap *w*. A thick washer *x*, of vulcanized India-rubber, is placed in the bottom of the collar-seat against which it is pressed, and rendered air or water-tight. This washer *x*, of vulcanized India-rubber, also fits close to the stem of the hand-lever *t*, on which is a small collar *y*, that presses it close to the collar *v*, so as to render the whole air and water-tight at that point. The screw part of the barrel at top is connected with the supply; and the screw part at bottom of the barrel is placed in connection with the receiver. When it is desired to draw off the liquid, the hand-lever *t*, is depressed; which raises the valve *h*, by its connection with the stem at the lower part, and allows an uninterrupted flow of the fluid; and again, when released, the spring *s*, brings the valve down to its seat, assisted by the pressure of the fluid in the supply-vessel. Although water may remain in the barrel below, the valve, the lever action, and fitting will remain quitet ight, and prevent escape at that point.

The patentee claims the making of taps or valves which open against the pressure of the fluid to be discharged, fitted, actuated, and arranged, as hereinbefore described.

To George Sant, *of Norton Lodge, Mumbles, Swansea, for improvements in clocks or time-keepers.*—[Sealed 18th May, 1853.]

This invention consists in applying to the pendulum of clocks an escapement-wheel which vibrates with the pendulum; a tooth of the escapement-wheel being allowed to escape at each vibration, by means of a fixed incline and a locking-pin. And in order to give motion to the next or minute-wheel, the escapement-wheel on the pendulum, by a projection, releases a detent, and allows one tooth of the next or minute-wheel to move every minute; at the same time the reaction of the detent keeps up the power to the pendulum, and from this wheel the other motions of the clock or time-keeper are derived.

In Plate XII., fig. 1, *a*, is a wheel furnished with sixty pins, two only of which are represented at *b*, and *c*, to shew their action on the metal plates *d*, and *e*. *f*, is the pendulum which carries the metal plate *d*, and also the wheel *g*, which has thirty pins in front, and one *n*, at back. *h*, is a locking-pin, (a plan of which, with the wheel *g*, &c., is shewn at fig. 2,) made in one piece, and attached to the framework or case. *l*, is a beam carrying the steel plate *e*, on which each pin of the wheel *a*, impinges and rests, immediately after having given an impulse to the pendulum through the plate *d*. This beam and the pendulum are both furnished with light springs at their points of suspension, similar to those usually employed in the suspension of pendulums. The wheel *a*, (assuming the pendulum to beat seconds) makes one revolution in an hour, and the wheel *g*, one in a minute. The action is as follows:—The pendulum *f*, which is shewn at the left-hand extremity of its arc of vibration, in its return swing to the right, carries the pin *o*, of the wheel *g*, against and up the right incline of the locking-pin *h*; the effect of which is the $\frac{1}{60}$ of a revolution of the wheel *g*, in the direction indicated by the arrow, and the fall of the pin *n*, into a line joining the axis of the wheel *g*, with *k*, which is a projecting pin attached to the beam *l*. In this position, and just before the pendulum has completed its right oscillation, it will be carried against the head of the pin *k*, and forcing it to the right, causes the plate *e*, of the beam *l*, to liberate the pin *b*, of the wheel *a*. At the time of this liberation (the pendulum being to the right as described) the metal plate *d*, attached to the pendulum, will be between the pins *c*, and *b*; so that the pin *c*, (the wheel *a*, being free to move in consequence of such liberation) falling on the plate *d*, will give to the pendulum, in its return swing to the left, an impulse in that direction; the impulse of course being given by, and lasting, during the passage of the pin *c*, down the incline of the plate *d*. It will thus be seen that the pin *n*, leaves the pin *k*, on the return swing of the pendulum to the left, in time to allow the plate *e*, to take the position shewn before the pins of the wheel *a*, leave the incline of the plate *d*. In other words, the steel plate *e*, returns to the position shewn before the pin immediately above it quits the metal plate *d*. At every return vibration of the pendulum, the locking-pin *h*, moves the wheel *g*, through $\frac{1}{30}$ of a revolution; so that the pin *n*, of the wheel *g*, in its next swing to the right, with the pendulum, will be found to escape the pin *k*, by passing below it. And it will be seen that fifty-nine seconds or vibrations

will transpire before the pin *n*, of the wheel *g*, is again thrown on the pin *k*, and the series of movements above-described repeated. The centre *p*, of the wheel *a*, carries the minute-hand. The hour-hand motion is obtained in the usual way. The weight *w*, hangs on an endless cord; and in order to wind up the clock, the rope below the weight is held by one hand, while the weight brought horizontally is slidden up the rope; and when allowed to drop into its vertical position, the eye of the weight, through which the rope passes, will offer a sufficient bite to the rope to prevent its slipping or sliding thereon. By this arrangement all back or reverse action during the time of winding is prevented.

Fig. 3, shews a modification of the above-described apparatus. In this the beam *l*, is made to carry both the metal plates *d*, and *e*, as well as the wheel *g*. The locking-pin *h*, is fixed to the pendulum *f*. The pin *n*, is driven into the same side of the wheel *g*, as that on which the thirty pins are fixed; with this exception,—the wheel *g*, is similar to that shewn in the apparatus, represented at figs. 1, and 2. When this pin *n*, has travelled to that point in which the locking-pin *h*, in its swing to the left impinges on it, similar actions follow with the wheel *a*, and metal plates *d*, and *e*, as described and represented at figs. 1, and 2.

To Charles Lowe, *of Sheepy Hall, in Sheepy Magna, in the county of Leicester, for improvements in mills for grinding wheat and other grain.*—[Sealed 14th April, 1853.]

These improvements have reference to that part of a flour-mill commonly called the stone case, and also to the spout or spouts by which the flour or meal is conveyed away from the stones. It is well known that grain in general, but especially when in a damp state, becomes more or less heated during the process of grinding, while at the same time a portion of the water or moisture contained in it is converted into steam or vapour, which, owing to its specific lightness, does not readily descend through the spouts; and, owing to the centrifugal force imparted to it, by the runner-stone, with which it is in contact, it cannot escape over the back of the stone, and, consequently, it condenses and forms paste in the case and spouts; thereby causing considerable loss and inconvenience.

In the figure in Plate XI., *a*, is a skeleton and ventilating

case or other framework surrounding the stones, covered with cloth, wire gauze, bolting-cloth, horse-hair, or any other substance that will retain the flour and allow the heated air and moisture to escape through it. *b, b,* are the sides and covers of the flour or meal spouts, formed in a similar manner, and covering them with the same or any other substances that will effect the separation of the heated air and moisture from the flour or meal; and *c,* is a spout, on the top of the case, to aid the escape of the heated air.

The patentee claims the formation of the stone case and spouts of cloth, wire gauze, or any other similar substance that will allow the heated air and vapour to pass through it away from the flour, either in ordinary mills, or in mills in which air-blasts, exhausts, or similar artificial means, are used.

To George Young, *of Neath, South Wales, merchant, for improvements in grinding wheat and other grain.*—[Sealed 18th June, 1853.]

This invention consists of a peculiar arrangement or combination of apparatus for ventilating mill-stones. A double tube is fixed in the eye of the upper mill-stone, on the upper end of which double tube are fixed trumpet-mouthed blowers, which, by the rotation of the stone, drive air into the double tube, and cause it to pass between the grinding surfaces. And in order that the air may not pass back, a conical leather or other packing is applied to the upper end of the double tube, through and within which the supply-pipe passes and rotates; and with a view to prevent the air passing into the case of the mill-stones, a conical leather or other packing is used. In addition to the air being forced in between the grinding surfaces, the air is also withdrawn from the case of the mill-stone, to which, however, no claim is separately made.

In Plate XI., fig. 1, shews a vertical section of a pair of mill-stones and apparatus arranged and combined according to this invention; and fig. 2, is a plan of the air-collecting apparatus, which revolves with the upper stone. *a,* is the bed stone; and *b,* the upper stone, which is driven in the ordinary manner. In the eye of the upper stone is fixed an apparatus for collecting air and causing it to descend to the opening or space between the mill-stones. This apparatus consists of two concentric tubes *c, d,* connected together, and fixed in the eye of the upper mill-stone. These tubes at their upper end carry open heads *e, e,* which collect the air,

and cause it to descend. The patentee remarks that he is aware that instruments very similar to those shewn at *e, e*, have before been applied to mill-stones for collecting air, and for propelling it between them; but in such cases they have been combined with other and different parts than those herein described: he does not, therefore, claim the parts *e, e*, separately. At the upper part of the tube *d*, is a conical tube of leather or other suitable material *f*, to prevent the air ascending and passing away in that direction. *g*, is the tube and funnel through which the grain to be ground passes; *h*, is a conical leather or other suitable material fixed at its upper end to the cover or case of the mill-stones; *i*, is a conical tray of metal fixed to the outside of the tube *c*; and it is by means of the parts *h*, and *i*, that air is prevented passing from the exterior into the interior of the hoop or case of the mill-stones. *j*, is a pipe or passage leading from the case or hoop of the mill-stones to the trunk or passage *k*; from which another trunk or passage passes to the fan *l*; by which means air and the "stive" is conveyed away from the case of the mill-stones into a room for the stive to settle in.

The patentee claims the combination of parts *c, d, e, f, h, i*, applied to mill-stones; and, combined therewith, the use of apparatus to withdraw air from the case of mill-stones.

To George Pollard, *of Watling-street, envelope manufacturer, and* George Mumby, *of Hunter-street, Brunswick-square, mechanical draughtsman, for improvements in machinery or apparatus for the manufacture of envelopes.* —[Sealed 24th August, 1853.]

This invention relates to improvements in apparatus or machinery for the manufacture of envelopes, whereby the several processes of feeding the blanks, gumming, stamping, folding, and delivering, may be performed by the manual labour of one person; thereby simplifying the construction of such apparatus. The blank is fed upon the folding-box, and when secured in its proper position, is gummed on the lower flap; and simultaneously with this operation it is embossed or stamped on the opposite or seal flap, and also on an under flap, with the maker's name, by means of a suitable embossing press. This being accomplished, the lever which works the moveable bottom of the folding-box is held firmly whilst the folding-plunger is forced into the folding-box, when the blank undergoes the first operation of folding. When the

plunger is raised, the incliners (which consist of springs placed on each side of the box) coming into operation, give the necessary inclination to the flaps, in their respective order, previous to the final descent of the plunger, and by means of the internal pressers contained in the plunger, the side flaps are pressed down upon the gummed surface,—thereby securing them in a proper manner: the same process also completes the folding and finishing of the envelope. After this operation, the folded or completed envelope is allowed to fall through the folding-box, by lowering the moveable bottom at one end, so as to give it an inclined position.

The envelope falling through may be guided into a proper reservoir by means of a trough or spout.

In Plate XII., fig. 1, represents a complete side elevation of the improved envelope machine; fig. 2, is a corresponding end view of the same, with a portion of the bed-plate and frame cut away to shew certain portions of the mechanism more clearly; fig. 3, is a longitudinal section of the folding-box in detail; and fig. 4, is a corresponding plan of the box. Fig. 5, is a transverse section of the gum reservoir, shewing one of the gummers in elevation inside the reservoir; and fig. 6, represents a corresponding plan of the same, with a portion of the cover broken away to shew one of the gummers. Fig. 7, represents a longitudinal vertical section of the creasing and folding plunger, shewing the pressers inside; fig. 8, is a corresponding plan of the same; and fig. 9, is a transverse vertical section taken through the centre thereof.

a, a, is a rectangular bed-plate bolted to the cast-iron supporting standards *b, b,* fitted with lugs *c, c,* for the facility of securing the machine to a table or work bench. *d,* is a cast-iron standard or bracket support, bolted to the bed-plate *a,* and fitted with rectangular guide-plates *e, e,* which are bolted together, and form a guide for the rectangular sliding-rod *f.* To the lower end of this rod is keyed the folding-plunger *g,* composed of gun-metal, and shewn in figs. 7, 8, and 9; and to the interior of this plunger are fitted the pressers *h, h,* which are screwed to the under side of the transverse-plate *j,* which is cast in one piece with the boss *k.* This plate slides vertically up the two fixed guides *l, l,* and is kept elevated to the screw heads by the helical springs *n, n.* The plunger is kept elevated by a pair of blade-springs n^1, n^1, and its descent is effected by the lever handle *o,* which works on a fixed centre at *p,* screwed into the top of the column or support *d,* which is cast hollow to form a receptacle for gum. A small pipe *q,* fitted with a stop-cock, serves to conduct the

gum from the lower portion of the receptacle to the reservoir *r*, shewn at figs. 5, and 6. The gum is supplied to the receptacle *d*, through the aperture shewn in dotted lines at *s*. The gum reservoir *r*, is situated at one side of the folding-box *t*, and is fitted with two vertical projections *u*, over which is placed a piece of lint *v*, or other suitable absorbent material, which is kept saturated with gum. *w*, is the lid or cover of the reservoir, having two slots formed therein to allow the lint or other absorbent material to project through it. A dabber *x*, is fitted immediately over the gummers: it consists merely of an angular piece of metal corresponding with the position of the gummers in the reservoir; and its under side is faced with a layer of vulcanized India-rubber, to form an elastic pressing surface. The dabber is attached to the lower end of the vertical spindle *y*, which slides freely through the bracket of the support *d*, and is kept elevated by the helical spring *z*.

The folding-box *t*, shewn at figs. 3 and 4, is composed of gun-metal like the plunger, and is bolted to the bed-plate *a*. Four blade springs a^*, a^1, a^1, a^{11}, termed incliners, are screwed on to the upper edge of each side of the box,—the sides being recessed internally to receive the springs when pushed back. The action of these springs is to incline each flap of the envelope inwards after the first descent of the plunger, in readiness for the second descent, which completes the fold. In order to give such an inclination to the several flaps as will cause them to be folded in their proper order on the second descent of the plunger, the inward projection of the springs is varied, as will be seen by referring to fig. 3. Thus the bottom flap of the envelope, or that which has to be folded first, has a greater inclination given to it, which is effected by causing its incliner a^*, to project further inwards than the other three; and the plunger is fitted with a projecting tongue-piece, in order that this flap may be folded first. The two end incliners a^1, a^1, have the next greatest inward projection, and, consequently, the end flaps are the next ones folded; whilst the seal-flap incliner a^{11}, has the least inward projection, and therefore the seal flap will be the last one folded. The embossing of one of the under flaps with the maker's name is effected simultaneously with the stamping of the seal-flap, by means of the fly-press b^*. In order to effect this double stamping simultaneously, the lower portion of the vertical slide is forked, and fitted with suitable dies c^*, and d^*. The vertical spindle of the fly-press is guided by the bracket support e^*, which is bolted to the bed-plate. The envelope, when folded, is allowed to fall from the

folding-box into the inclined shoot *f**, whence it falls into a box or other suitable receptacle. To effect this, the bottom *g**, of the folding-box turns on a hinge at *h**; and it is opened, when required, by elevating the lever handle *i**, which is connected to the under side of the moveable bottom *g**, and works on the fixed centre *j**. In operating by this machine, a blank is fed on to the folding-box *t*, by the attendant, and is accurately adjusted by being dropped between the four guides *k**, *k**, one of which is situated at each corner or angle of the folding-box. The attendant then gums and stamps the blank simultaneously by bringing down the dabber with one hand,—whilst a partial revolution of the fly-press is effected with the other: he then effects the folding action by pressing on the lever handle *i*, with one hand, which holds the bottom of the box firm in its place; and, with the other, bringing down the lever *o*, which causes the plunger to press the gummed and stamped blank into the folding-box. By the descent of the plunger in the folding-box, the incliners are pushed out of the way into the recesses formed to receive them. In this state of the apparatus the four flaps are raised to a vertical position, and the plunger is withdrawn from the box; whereupon the flaps are inclined inwards by the incliners in the manner hereinbefore described, and the plunger is again brought down, which completes the fold, and firmly unites the gummed surfaces, by pressing them together, through the agency of the spring pressers *h*, *h*, contained therein. The handle *i*, is then raised, and the bottom of the folding-box opened; whereupon the finished envelope is allowed to fall into the shoot, whence it drops into a suitable receptacle,—the movements of the machine being completed. The shape and strength of the incliners may be varied, according to circumstances.

By a slight modification of the above arrangements, the working parts may all be actuated by cams, excentrics, or cranks on a main actuating shaft, which would be fitted with a fly-wheel and winch handle or crank, to be driven either by hand or foot.

The patentees claim, First,—the general arrangement and construction of machinery or apparatus for effecting the gumming, folding, and stamping of envelopes, as hereinbefore described. Second,—the application and use of spring-pressers placed inside the plunger, for the purpose of effectually uniting the gummed surfaces of the envelope. Third,—the system or mode of inclining the flaps of partially-formed envelopes by means of springs acting inside the folding-box.

To William Nash, *of Burslem, in the county of Stafford, whitesmith, for an improved mode of manufacturing china and earthenware articles on the lathe.*—[Sealed 14th September, 1853.]

This invention relates to the use of a novel construction of profile gauge or cutter, in the manufacture of door-knobs, and other articles that are trimmed up or brought to shape in the lathe. It has heretofore been usual to construct the profile of a flat piece of metal with the cutting-edge filed or moulded to the sectional shape of the article to be produced; but this construction of profile, on wearing away by use, loses its proper form, and requires constant repairs to ensure the continued manufacture of the same form of article. Now, the object of the present invention is to remove the necessity for constant repairs, which is effected by forming the profile of thin sheet-steel, and bending and setting it, so that the figure of its cross section, as well as that of its cutting-edge, shall correspond to the profile of the article to be manufactured.

In applying this cutting-tool, it is preferred to mount it on a slide-rest, and bring it into contact with the upper part of the lump of clay or embryo article, while the same is rotating in the lathe, instead of bringing it to bear against the sides, as is usual when operating with the common profile. The advance of the cutting-tool may be effected by hand, or otherwise, after the manner of tools in slide-rest lathes.

In Plate XI., is shewn the improved cutting-tool as attached to the slide-rest of a lathe; fig. 1, being a side elevation, and fig. 2, an end elevation thereof; the tool, in this instance, being adapted to the manufacture of door-knobs. *a, a,* is the rest-socket of the lathe, and *b,* the slide which works in V-guides as usual. This slide *b,* carries at its forward end a block *c,* the figure of which corresponds in cross-section, both in size and shape, with the profile of the article to be manufactured. To this block *c,* the cutting-tool *d,* formed by preference of thin sheet-steel, is secured, by means of a clamp *e,* which corresponds on its under side to the figure of the cutting-tool, and, fitting closely around it, holds it by the aid of binding-screws *c**, down to the block *c.* In order to allow of the cutting-tool being shifted forward as the edge becomes worn away, it is slotted at its upper part so as to permit of the screws *c**, passing through it without presenting an obstacle to the adjustment of the tool. The lateral extremities of the tool are secured to the clamp *e,* by means of binding-screws. The spindle of the lathe is shewn at *f,* and

upon its extremity, the ball of clay, to be converted into a door-knob, is to be placed. This spindle is supported by a bracket *g*, which also carries a bent spring *h*, for pressing upon the clay under operation at the opposite side to that which is in contact with the tool, and thereby neutralizing the tendency of the tool to push off the clay from the spindle. Rotary motion being communicated through the spindle *f*, to the clay, the tool is brought up in contact therewith by the workman pulling forward a lever, the end of which works in a slot *b**, in the hinder end of the slide *b*. An adjustable stop *i*, is attached to the slide *b*, in order to prevent the tool from being moved so far forward as to throw the cutting-edge of the tool out of action. When the tool, by being gradually advanced to the position shewn at fig. 1, has removed the superfluous clay, it is thrown back clear of the work. The knob is then removed from the spindle, and a fresh ball of clay is applied thereto, which, in like manner, by the gradual movement of the tool to its advanced position, will be trimmed down into the required shape. The forward edge of the clamp *e*, is chamfered, to allow the clay to pass away freely as it is thrown off by the cutting-tool. In order to shift the tool, as it wears away, further forward on the block *c*, it is only necessary to slacken the binding-screws, and it will then be free to be adjusted to the required position.

From the foregoing description it will be obvious that a great variety of articles in china and earthenware may be produced, according to this invention, by shaping the cutting-tool, the carrying-block, and the clamp, to the profile of the article required to be manufactured. By the use of this construction of cutting-tool, it will also be understood that articles of an unvarying configuration may be produced; the wearing away of the cutting-tool having no other effect than to keep the cutting-edge sharp and fit for its work.

The patentee claims the exclusive use, for the purpose of manufacturing china and earthenware articles, of the profile gauge or cutting-tool, constructed and operating as above described.

To FREDERICK WILLIAM MOWBRAY, *of Bradford, in the county of York, engineer, for improvements in doubling wool and other fibrous substances.*—[Sealed 2nd April, 1853.]

HERETOFORE, in doubling yarns of wool and other fibrous materials, it has been the practice to support the bobbins

from which the yarns are being drawn, upon fixed or stationary spindles; and the only motion which such bobbins received was a motion each had upon its own axis, by the act of drawing the yarn therefrom; consequently, the only twist obtained, was that produced by the revolution of the flyer in the passage of the yarns from the drawing rollers to the flyer. Now this improvement consists in supporting each set of bobbins (from which yarns are being drawn to form a thread) in a frame, to which rotary motion is given, in order to put twist on the yarn in its passage to the drawing-rollers, as well as by the flyer in its passage from the rollers.

The figure in Plate XII., represents the section of a frame, with the improvements applied thereto. *a, a,* are spindles formed at a^1, to receive the bobbins *b, b*; but the same may be formed to receive other number of bobbins, according to the number of yarns required to be twisted together to form a thread. The yarn from each bobbin *b*, passes through eyes *c, c,* (formed in the frames c^1, affixed to the spindles *a*,) to the drawing-rollers *d, d,* which are formed and caused to revolve in the ordinary manner, except at a greater speed; and thence the yarns pass to the flyer and bobbin *e*, as is now the practice. Upon each spindle *a*, is formed a wharve *f*, around which, as well as the wharve *g*, on each spindle e^1, passes a cord or band *h*, from the drum or cylinder *i*, by which the spindles are each set in motion.

The patentee claims the putting twist on to yarns in their passage to the rollers *d*, as well as in their passage therefrom to the flyers.

To John James Kerr, *Lieutenant in the Royal Navy, of Gloucester Grove West, Old Brompton, for improvements in the manufacture of cartridges.*—[Sealed 4th June, 1853.]

This invention consists in employing cylindrical cases without seam, made of metal tin, coated with fibre or flock, for receiving powder, shot, and ball.

In carrying out this invention, collapsible vessels, made according to an invention described in the specification of a patent granted to John Rand, 29th September, 1842, are employed; and such cases or vessels are to be made of sizes suitable for the barrels of fire-arms, and charged with powder, or powder and shot, or powder and ball (placing a wad between the powder and the ball or shot), in like manner to that in which cases of paper have heretofore been

charged, and as is well understood in making cartridges. Such metal cases having been charged, the open end is closed, so as to completely envelope all parts with the metal. A solution of gum, or other suitable cement, is then applied (cements being preferred that are not soluble in water) to the exterior surface, and flock or fibre is attached thereto, by which a complete coating is obtained, which is advantageous. And it is this manufacture of cartridges which constitutes this invention.

To WILLIAM BRADBURY *and* FREDERICK MULLETT EVANS, *of Whitefriars, for improvements in taking impressions and producing printing surfaces,—being a communication.* —[Sealed 11th May, 1853.]

THIS invention consists in placing plants and other vegetable matters, insects, and other substances, between a surface of steel and a surface of polished lead, and, by pressure, obtaining an impression on the lead, and, from such impression, obtaining an electrotype surface suitable for printing.

In carrying out this invention sheet-lead is employed, and, for this purpose, the surface thereof, on which an impression is to be taken, is to be made smooth by scraping and polishing. This prepared surface is then to be placed in contact with a polished surface of sheet-steel, and passed between a pair of pressing-rollers, by which the surface of the lead will be rendered very even, and suitable for receiving an impression from the surface of a plant, leaf, or other vegetable matter, or from a feather, or from an insect, or other surface; and this is accomplished by placing the plant or other matter, in a flat and a dry state, between the lead and the steel plate. The two plates are then to be subjected to pressure, by passing them between pressing-rollers, or otherwise. The impression on lead, thus obtained, is to be used for the purpose of obtaining therefrom an electrotype plate of copper, as is well understood, by depositing copper thereon; and it is preferred, for this purpose, to use a solution of sulphate of copper. A plate of copper having, by such means, been obtained, the face thereof is burnished at those parts where the impression does not come; and this first electrotype plate is then used in order to obtain a second electrotype plate, by depositing copper thereon, and, by preference, from a solution of sulphate of copper. This second copper plate is the one used as a printing surface, and impressions are taken or printed therefrom in the ordinary manner of printing from engraved plates.

The patentees claim the combined means, herein described, of taking impressions and producing printing surfaces; and also the employment of lead for obtaining impressions and for receiving electro depositions of copper.

To George Johnson, *of Stockport, Doctor of Medicine, for certain improvements in looms for weaving.*—[Sealed 17th March, 1853.]

This invention relates to certain novel arrangements of mechanism for forming the shed or opening in the warp-threads of looms, and consists principally of a roller furnished with a series of grooves running parallel to each other, and at right angles to the axis of the said roller, and corresponding with the spaces between the dents of the reed. The warp-threads pass through these grooves, and rest upon certain thread-lifters, two being in each groove, and those of one groove being at right angles to those in the next groove (if for weaving plain cloth); so that when the thread-lifters are vertical, one over the other in one groove, the thread-lifters in the next groove are horizontal, and in a line with the axis of the roller. Two warp-beams, weighted so as to give tension to the warp-threads, are employed; and it will therefore be evident that in those grooves where the thread-lifters are perpendicular, the warps will be lifted, whilst in those grooves where the thread-lifters are horizontal, they will be depressed. Rotary motion (either constant or intermittent) being communicated to the grooved roller, the several warp-threads will be alternately raised and depressed, according to the relative arrangement of the thread-lifters in their several grooves. The grooved rollers will be most readily formed of discs of tin or other metal plate placed consecutively upon a shaft; the thread-lifters being placed between them, either attached to them or not, and arranged according to the pattern desired. A double or cylindrical cloth, or two separate cloths, may thus be woven at one operation, by having one set of warp-threads above and one set below the grooved roller.

In Plate XII., fig. 1, is a section of one form of harness. The dotted lines represent the warp-threads, which pass from the warp-beams over a roller *a, a,* to the grooved roller for forming the shed. This roller (see the plan view, fig. 2,) is formed of metal discs or divisions *b, b,* and thread-lifters *c, c,* of an elongated oval form. One of these thread-lifters is soldered or otherwise fastened to one side of each disc, and

the discs are placed consecutively upon the square shaft *d, d,* with the thread-lifters alternately vertical and horizontal. Thus it will be evident that as the grooved roller revolves, the warp threads will be alternately raised and depressed, and thus a shed will be formed for the shuttle to pass through. *e, e,* is the breast beam, and *f, f,* the cloth roller. Fig. 3, is a section, and fig. 4, a plan view, shewing a modification of the above. In this instance, the thread-lifters are formed of small discs, pins, or pulleys *c, c,*—two being attached to each disc. Fig. 5, is a section, shewing another modification of the same, in which only a portion of a disc is employed; the motion given to the roller being one-fourth of a revolution alternately in each direction. *g, g,* is a weight to counterbalance the thread-lifters. Fig. 6, is a section of a grooved roller, similar to that represented in fig. 1, shewing the method of weaving a double or cylindrical cloth, or two separate cloths, by means of two sets of warp threads. Fig. 7, is a section, and fig. 8, a front view, representing the adaptation of a small portion only of one of the grooved rollers, for raising and depressing the ordinary healds or harness. *a, a,* represent the discs; and *b, b,* the lifters; *c, c,* are straps or bands resting upon the lifters, and passing over pulleys *d, d,* to the healds *e, e,* to which they are attached. *f, f,* are two straps or bands connecting the healds and passing under pulleys *g, g.* It will be evident that as the lifters *b, b,* revolve, they will alternately raise and depress the healds or harness *e, e.*

The patentee claims the novel and peculiar form or construction of grooved roller (and the application thereof to looms for weaving) to be employed for the purpose of forming the shed or opening in the warp threads for the shuttle and weft thread to pass through; whether the thread-lifters act directly upon the warp threads, or upon the ordinary healds or harness.

To JOHN CARVALHO DE MEDEIROS, *of Passy, near Paris, merchant, for improvements in the means or processes for preserving metals from corrósion,—being a communication.*—[Sealed 1st August, 1853.]

THIS invention consists in applying mercury or quicksilver to any metallic surface which possesses affinities for quicksilver (and it may be applied to metals not having such affinities), by means of an intermediate surface, such as galvanized iron.

The process of applying it may be performed mechanically

or by machinery, or other convenient means; but the mode of application preferred is by dissolving the salts of mercury, such as the bichloride or any other of the oxides or salts of mercury, in hydrochloric acid and water, or in any other acid or menstruum in which these salts are soluble; taking care that the specific gravity of the solution be such as to act with energy on the metal to be amalgamated; and which specific gravity need never exceed 1·12, nor descend lower than 1·5, or 6. Into a solution so prepared, place the metal plates, whether of copper, zinc, lead, tin, iron galvanized, or other metal or alloys of metal, and allow them to remain until their surface is properly and equally amalgamated. When so operated upon, take them out, and allow the mercury to set on the surface.

If the plates be for ships' sheathing or iron ship building, they must be again dipped into a solution of arsenious acid, prepared in the same way as that for the mercurial solution; after a few moments' immersion in this bath, they should be taken out and placed in a drying oven or other apartment, whose heat need not exceed 300 Fahr. When dry, rub or brush the surface: after which the metals are fit for use.

When the metals are for house roofing, or for telegraph wires, or iron railing, the arsenical solution is dispensed with.

The patentee claims the application of mercury or quicksilver to metals, whether singly, such as copper, zinc, lead, or other metal, or in alloy, such as galvanized iron or Muntz's metal; and also the discovery that amalgams of mercury, so applied with any other metals, constitute a voltaic pile repulsive to sea animalculæ, such as barnacle or other shell fish, and also sea-weed or other marine matter containing animal or vegetable life; and prevent oxidation in excess, in the proportion of about 1 to 50 in copper in its normal state in sea water, and 1 to 1000 in common air.

To John Davie Morries Stirling, *of the Larches, near Birmingham, Esq., for improvements in the manufacture of rails and parts of railways, and tyres of railway wheels.*—[Sealed 27th August, 1853.]

This invention has for its object the piling certain descriptions of iron for the purpose of being rolled into bars, for the rails of railways, for switches and crossings of railways, and for tyres of railway wheels, and consists in piling bars of iron rendered crystalline by means of tin, antimony, arsenic, or bismuth, with bars of other iron (combined or not with zinc),

to give fibrous character to the interior and other parts of such compound bars; the crystalline iron coming to the wearing surfaces.

In Plate XI., figs. 1, and 2, shew two piles of iron; the outer plates *a, a,* and *b, b,* being of that kind of iron known as "Stirling's patent hardened iron," and which is manufactured according to the improvements described under previous letters-patent granted to the present patentee. In the piles, fig. 1, the edges of the side plates *b, b,* are covered by the top and bottom plates *a, a*: whilst in fig. 2, this arrangement is reversed; the side plates *b, b,* covering the edges of the top and bottom plates *a, a*: the object being to enclose the more fibrous iron *c,* of which the interior of the piles is composed, with iron, hardened by the use of tin, antimony, arsenic, or bismuth, as is now well understood. The bars rolled from the piles, figs. 1, and 2, are intended for, and will be found very useful in, constructing the wing and point rails of railways. Figs. 3, and 4, shew three forms of piles suitable for being rolled or formed into flanched or unflanched tyre-iron for railway wheels. In each of these cases the plates *a, a,* are of the patent hardened iron above-mentioned, and the other plates *c, c,* are of more fibrous iron. The number and thickness of the plates composing the piles may be varied, so long as the arrangement of the fibrous and crystalline iron is such as described. The patentee observes, that he prefers, for the more fibrous parts of each pile, to employ that description of iron which has been rendered more fibrous by the use of zinc, as described by him under former patents; but other fibrous iron may be used in place thereof. In making piles of fibrous and hardened iron, more especially when intended for tyres, it is recommended to pile the iron so that the bar or bars, which are intended to form the wearing or flanched surface, should be made longer than the other bars of the pile, and that the pile should be constructed as is shewn in fig. 5; care being taken by the workman that the projection of the upper bar or bars (if the pile be placed upon the smaller base) be not to such an extent as to endanger the burning of the projecting parts when in the furnace. It is also recommended that, where the hardened bar or bars, as above described, do not extend over the whole width of the pile, they be formed, as shewn in fig. 4, narrower in the upper surface than on the lower; and that the outside bar or bars of fibrous or common iron, which form the remainder of the upper surface of the pile, shall have a corresponding angle, as shewn.

To Samuel C. Lister, *of Manningham, in the county of York, for improvements in machinery for washing wool and hair.*—[Sealed 1st August, 1853.]

These improvements in washing wool, &c., consist in covering washing-rollers with gutta-percha or unvulcanized caoutchouc, or similar material, either in combination with other substances or otherwise; also in causing wool or hair to pass through a washing-bowl, by means of a trough or spout placed inside a long washing-bowl. The wool or hair is fed to the spout by an ordinary feed-cloth, and is then carried forward by revolving vanes, which cause the water and wool or hair to be constantly moving along the trough or spout; and at the opposite end to that into which it is fed is placed an endless apron or cloth, which receives and carries the wool or hair forward to the squeezing or expressing-rollers; and by this means the wool or hair is constantly fed in at one end, and delivered at the other, through the expressing-rollers.

The plan proposed for carrying out this invention is to cover washing-rollers with unvulcanized cautchouc or gutta-percha, or similar material, either in combination with other substances or otherwise, and to make it into rings or washers, and then to put them upon an iron roller of suitable diameter, and press them together between iron flanches, so as to make them as solid as possible; or the roller may be covered in one piece.

In the figure in Plate XII., a^1, and a^2, are a pair of feed-cloths. The wool is laid upon a^1, and compressed and carried forward by a^2; the upper and lower feeding-apron travelling at the same speed (say about two surface feet per minute), and is delivered by the rollers b^1, and b^2, to a revolving-fan *c*, going at about twice the speed of the feed-rollers. This fan works in a trough *e*, placed within the washing-bowl *h*, and is full of holes at the bottom, so as to allow the water free entrance; care being taken not to make the holes too large; for in that case the wool would go through into the water beneath. *d*, is another fan in the trough *e*, which carries the wool forward on to the feed-apron *f*, which then delivers it to the squeezing or expressing-rollers *g*, *g*. The dotted line represents the level of the sud.

The patentee remarks that he does not claim any of the parts separately, nor does he confine himself to the details; but what he claims is, the combination of apparatus for washing wool and hair.

To Thomas Weatherburn Dodds, *of Holmes Engine and Railway Works, Rotherham, engineer, for improvements in the treatment and manufacture of iron and steel.*—[Sealed 7th March, 1853.]

This invention relates as well to the primary treatment and manufacture of iron and steel from the raw material or metal, as to the application of such manufactured metals, or the steeling or case-hardening processes thereof, to special articles of metal manufacture. In making a mass of steel by this process, the operator places the raw unmanufactured material, or wrought-iron, in a suitable case, chamber, or furnace, containing a mixture of any suitable carbonaceous matter, as charcoal (by preference), potash, pearlash, or other alkaline matter, and carbonate or bicarbonate of lime, as marble chippings, gypsum, oyster-shells, or other matters containing lime. The common kind of furnace may be used for this process; but it is preferred to adopt a plan of furnace wherein a range of retorts is so built and contrived that the working heat may be kept up uniformly, or nearly so, whilst the charging and discharging operations are going on; each retort being drawn in succession, and the treated metal plunged into a wet or dry carbonaceous bath or bed to cool. By the adoption of this system, the furnace is prevented from sustaining injury in rapid heating and cooling; whilst the cost of the process of manufacture is considerably reduced. For the production of a non-oxydizable metal or steel, for various uses, a quantity of nickel is incorporated in the metal, in any convenient manner. And in annealing wrought-iron articles, or articles partially steeled or case-hardened, a bath or compound mass of carbonate of lime and soda, or pearlash or potash, is used. This treatment produces a fine, soft, fibrous metal; and the process is especially valuable for softening the inner non-abrading portions of railway wheel tyres.

Another part of this invention relates to the mode of obtaining a rapid and effective tilt action in hammers or helves for the manufacture of metals,—the actuating power in such apparatus being made to act in both directions of the hammer's movement. According to one modification, a constantly-revolving crank is placed either above or below the hammer-lever, and a connecting-rod or link is passed from this crank to the lever, so as to draw and press the hammer-lever in both directions. Or, by another modification, a steam cylinder may be placed above or below the hammer-lever, or on either side of the lever's fulcrum, with an adjustment for the varying length of stroke required, both at the working connection of

the lever and at the anvil. The anvil is supported by an arrangement of base, on the principle of the hydrostatic press, so as to secure an effective and certain means of adjustment as to height.

Fig. 1, Plate XII., is a vertical longitudinal section of a single steel furnace; that is to say, a furnace fitted up with a single row of retorts or manufacturing chambers. Fig. 2, is a corresponding vertical section of the furnace at right angles to fig. 1. Fig. 3, is a sectional plan of the furnace, taken through the line or story of retorts. Fig. 4, is a sectional plan taken through the line of retorts. Fig. 5, is a side elevation of one arrangement of improved tilt-hammer, as contrived for small work. Fig. 6. is a side elevation of a steam forge hammer. Fig. 7, is a detached elevation of the anvil, as supported on the hydrostatic principle. Fig. 8, is a sectional detail of an atmospheric buffer or spring, for obtaining a rapid action in hammers; and fig. 9, represents a detached detail of a portion of a steam-cylinder placed above instead of below the helve. In the arrangement of furnace shewn at figs. 1, 2, and 3, the retorts or chambers *a*, pass directly through the furnace, and are open at both ends *b*, for charging and discharging. *c*, is the fire-place for heating the retorts; and the heated currents pass up from the fire-place through the flues *d*, encircling the retorts, and escape by the overhead discharge flues *e*, above the dome *f*, which is built of fire-clay, fire-stone, or other suitable material. The openings *b*, to the retorts, may be either fitted with adjustable doors or left open to be bricked up after each charging operation. In fig. 4, the retorts are in two rows, set end to end,—each retort being open at one end *b*, only, but fitted up in other respects like the single-row furnace; the flues *c*, being similarly contrived for carrying the heated currents round the retorts. The composition found desirable to be used in the retorts, when manufacturing or treating the metal therein, is made up of ten parts of charcoal, one part of soda-ash, and two parts of lime; and when the articles are imbedded in this mass, the retorts are closed, and are heated to a bright-red heat, continuing for five or six days. The iron, which is now converted, is then withdrawn whilst it is in a red-hot state, and plunged into a bath of pure water, or water impregnated with carbonaceous matter, or liquid ammonia, or ammoniacal liquor, or a solution of prussiate of potash, or hydrate of potash; or it may be immersed in a bed or dry bath of carbonaceous materials, as highly carbonized sand or other material containing carbon. The proportions above given are found to be best suited for the purpose, but in cases

where steel is required to be of greater hardness, or to be used for purposes of superior delicacy, potash, pearlash, or other alkaline matter, and carbonate or bi-carbonate of lime, as chalk, limestone, marble chippings, gypsum, oyster-shells, or other matter containing lime, is substituted. In steeling or case-hardening by this improved process, the iron or the manufactured article, as the case may be, is placed in a retort charged in the manner already described; but when fineness or superior polish is required, bone-dust or animal charcoal is added in the proportion of one-twentieth, or thereabouts, of the compound mass. The articles are then treated as already explained, and are withdrawn from the retorts in a red-hot state, and plunged into a wet or dry bath in a similar way, after having been kept in the retorts for a period of two hours, or longer, according to the intended depth of steeling or case-hardening to be given. In any or either of these processes, the retorts are arranged, by preference, in the manner shewn; whereby the heat may be kept up to a uniform temperature,—the retorts being discharged and charged in succession; whilst the general furnace operation is continuous, so as to economize time and prevent injury to the furnace. In manufacturing non-oxydizable steel, as well as metal for articles requiring a superior polish, pounded nickel, German silver, or argentine, is used,—varying in amount from one twenty-fifth to four twenty-fifths of the mass of treated metal. This additional mixture is placed in the crucible in small pieces, imbedded in small balls of charcoal or plumbago paste, adding, in some cases, a small proportion of manganese; the mixture of charcoal, soda-ash, and carbonate of lime, or other flux, being used or not in this case. And, if English iron is used, a superior amount of carbon may be necessary.

In manufacturing cast-steel, suitable pieces of soft iron are placed in the casting-pot, vessel, or crucible, together with the mixture used for conversion,—taking care to skim the molten mass well before pouring it into the moulds. In constructing tilt-hammers for working metal of small size, or articles which vary but little in diameter and breadth, the general plan, shewn in fig. 5, is preferred. This tilt is entirely carried upon the base-plate casting *a*; on which are cast two parallel bearings *b*, fitted with brasses to receive the stud-centre *c*, fast in the lever, and on which the lever turns. The hammer-lever *d*, carries, upon its longer arm, the hammer *e*, fitted in the usual manner; and beneath its line of action is the stationary anvil *f*, with its tail recessed into the base-plate. The anvil bears, in reality, upon a layer of cork or other suitable elastic substance *g*, interposed at the shoulder of the

tail; and this elastic layer answers as a means of making allowance for the variation of the hammer-stroke, in conjunction with a similar elastic layer *h*, placed between the cap of the driving joint-slot and the solid part of the lever. The hammer is actuated by a short horizontal transverse shaft *i*, driven by the fast and loose pulleys *j*, and carried in pedestal bearings *k*, on the hammer base-plate or fly-wheel *l*,—being set on one end of the shaft to steady the motion. The central portion of this driving-shaft is cranked as at *m*; and this crank is passed through a sliding bearing brass *n*, set in a longitudinal slot *o*, in the short or back arm *p*, of the hammer-lever. In this way, as the cranked driving-shaft revolves, the crank-action rapidly elevates and depresses the hammer; giving a powerful action in each direction. The driving-shaft may be set on either side of the fulcrum or working centre of the hammer-lever; and, instead of the crank and slot-arrangement here shewn, the same end may be accomplished by the use of a connecting-rod or link between the crank and the hammer-lever,—the necessary elasticity being afforded by interposed layers of suitable material, at the points of junction of the details. In figs. 6, and 7, is shewn a larger tilt or forge-hammer. In this instance the helve or single hammer-lever *a*, is carried upon an end stud-centre *b*, working in the two pedestal bearings *c*, on the base support *d*. The hammer *e*, is at the opposite end of the helve; and between the hammer and the working centre is a short vertical steam-cylinder *f*. The piston of this steam-cylinder works up through a curved guide *h*, bolted to the top of the cylinder; and to the upper end of the piston-rod is jointed the lower end of a forked connecting-rod, or a pair of links *i*,—the upper end being jointed at *j*, to the lever overhead. The cylinder has an ordinary slide-valve *k*, fitted to it, arranged to be worked by a simple hand-lever *l*, for the regulation of the steam admission and exit, as the hammer is to be raised or lowered. And, instead of this manual working, the steam-action may be rendered self-acting by the addition of stops or tappets, or by any other known means, as will be well understood by any practical man. Immediately beneath the line of the hammer-action is a short hydrostatic cylinder *m*, properly bored out and fitted with a ram *n*,—the upper end of which carries the anvil-face *o*. This ram *n*, is thus capable of being raised or lowered at pleasure, by pumping in or withdrawing water from the cylinder in the usual manner of working hydrostatic presses; whilst the principle of this support enables the anvil to be carried in a solid and effective manner. By this plan of adjustment the full hammer-stroke

can be kept up, whatever may be the size of the work in hand. Fig. 9, shews a mode by which the actuating steam-cylinder can be arranged to work overhead,—links being passed downwards from the piston to the lever. The steam-cylinder may be arranged to act in one direction only for lifting the hammer, or it may be double-acting, so as to bring the hammer back also with the full steam pressure; and, instead of being stationary, as represented, it may be made to oscillate. For tilts or hammers where a very quick action is required, a species of atmospheric buffer is adopted, as shewn at fig. 8. This buffer consists of a short cylinder *a*, bored out and fitted with a ram *b*,—the top of the cylinder having a flap-valve *c*, to open inwards. This buffer being disposed above the hammer-lever, with the ram fitted at its lower end to receive the hammer as the latter rises, it follows that, during the fall of the hammer, the valve *c*, opens to admit air to the cylinder; but, when the hammer rises, the valve *c*, closes, from the internal air pressure in the cylinder, and, consequently, the upward traverse of the ram *b*, compresses the air in the cylinder, and produces a powerful spring to aid the downward hammering blow. The cylinder has an adjustable valve or stop-cock *d*, fitted into it, so that the attendant can regulate the strength of the spring by allowing more or less air to escape from the cylinder.

The patentee claims, First,—the general arrangement and construction of machinery, apparatus, or means for the treatment or manufacture of iron and steel, as hereinbefore described. Second,—the conversion of iron into steel, wholly or partially, by the use of a carbonaceous fuel, or a mixture of soda-ash, or soda, or potash, or pearlash, or other alkaline matter, and carbonate or bi-carbonate of lime, or matter containing lime with charcoal. Third,—the system or mode of converting iron wholly or partially into steel, by the use of a compound of soda-ash, lime, and charcoal, or any mixture of alkaline matter with carbonate or bi-carbonate of lime and charcoal. Fourth,—the system or mode of treating iron, or partially or wholly converted metal, by plunging the same, when red hot or thereabouts, into a wet or dry bath; that is, either into water, water impregnated with carbonaceous matter, or liquid ammonia, or ammoniacal liquor, or a solution of potash or hydrate of potash, or into a mass of dry carbonaceous material, as highly carbonized sand, charcoal, and soda-ash, or other carbonaceous matter. Fifth,—the system or mode of arranging and working the furnaces of conversion, wherein the retorts or converting chambers may be charged

and discharged whilst they are in a working condition, without being permitted to cool. Sixth,—the system or mode of adjusting the anvil-level of steam-hammers, by means of a hydrostatic cylinder or chamber. Seventh,—the system or mode of working hammer or tilt-levers, so as to strike in both directions, by the use of a rotatory crank-shaft connected therewith. Eighth,—the application and use of an atmospheric buffer, for increasing the rapidity of the hammer strokes. Ninth,—the application and use of cork or other partially elastic material, at the points of metallic connection of hammer details, for the purposes hereinbefore described.

To Thomas Allan, *of Adelphi-terrace, civil engineer, for improvements in electric conductors, and in the means of insulating electric conductors.*—[Sealed 12th Aug., 1853.]

This invention consists in forming the electrical conductors of submarine and subterranean telegraphs of iron rods, wires, or strands of wires, insulated or otherwise, in lieu of copper, as now used.

For submarine telegraphs, instead of the insulated copper wire conductors protected with iron, the patentee employs a stout iron wire or rod, or, what is preferable, a rope or strand of wires, which thus forms not only the conducting medium, but also the rope itself. When insulated, the iron need not be galvanized; thereby maintaining the full strength of the iron, besides effecting a great saving in cost.

The insulating medium requires to be of a material differing from that now used for the insulation of copper wires; and for this purpose the patentee employs a compound of caoutchouc, sulphur, and coal tar, or other similar substance, baked hard, and resembling in appearance the material manufactured according to the invention patented by Moses Poole, the 18th September, 1852, and which itself might be employed with or without certain modifications. By these means a submarine rope will be produced of the required weight, with the greatest amount of strength that can be obtained from iron of the best quality; whilst the conducting medium will be considerably better, and give less resistance than the copper wire now used for such purposes; besides which, many other electrical difficulties will be overcome, which it is not requisite to enter upon here.

Iron wire, or strands of small wires, insulated or otherwise, are substituted for copper, for underground electric conductors;

and this, with an insulating material of the nature before mentioned, will effect a great saving of cost.

In some cases, for the above purposes, strands of wires of two different metals are used,—that is, six or more iron wires, with a centre core or wire of copper or zinc. By this means, according to circumstances, a better conductor can be obtained than by the use of iron alone; and such conductors may be used for over-ground telegraphs, and suspended by means of posts, as well as for underground and submarine telegraphs. Under certain circumstances, the before-described conductors, without insulation, are employed.

The second part of this invention consists in a cheap and efficient mode of insulating electric conductors of copper, iron, or other metals, for subterranean telegraphs, but which may also be used for submarine purposes. The conductors are insulated several at a time, by means of a die or dies of the form and construction hereinafter described; by means of which, a large amount of the insulating material, whatever that may be composed of, is saved.

The object is not merely to coat or cover the wire with two or more coatings of any insulating substance at one operation, but especially to cover three, five, or seven, or any number of wires all at one operation, and all conjoined in one rope. For this purpose two or three hollow mandrils (according to the number of coatings) are placed in the die-piece, one behind the other; the first one at the back where the wire enters having the smallest aperture, the second being larger, and the last the full size to which the wire is to be covered; there being sufficient space between each to allow the insulating material to come freely in contact with the wire after each successive coating. To perform the same operation in the aggregate (say on seven wires), seven such series of hollow mandrils will be required, and worked in similar manner as if they were but one; and if required to be formed into one rope, the die will require an extra mouthpiece; so that the seven wires, when twice or thrice covered separately, may be again covered and conjoined all into one rope.

The patentee claims, First,—the adaptation of iron rods, wires, or strands of wires, or of strands of wires of different metals (insulated or otherwise), for submarine and subterranean telegraphs, as hereinbefore described. And, Secondly, —the mode of insulating several wires at one operation, as hereinbefore described.

Scientific Notices.

THE NEW BELGIC PATENT LAW.

We hasten to lay before our readers a translation of the new law of patents for inventions, as passed by the Belgian Legislature; but the publication of the Royal Decree, which regulates the execution of this law, we are compelled to defer for the present. It will be seen that, agreeably to the spirit of modern legislation on patents, whether in England, France, or the United States, the interests of inventors have been advanced, and a nominal tax only of 10 francs is demanded on the application for a Belgic patent. This tax is augmented annually, by the addition of 10 francs to the last payment, until it amounts to, at the twentieth year of the existence of the grant, 200 francs; after which the patent expires. This accumulating annual tax is no doubt intended to effect the object for which the periodical payments under the new English law have been devised, viz., to induce the abandonment of those patents which have been proved by experience to be useless. Besides the reduction in the cost of patents, some very liberal provisions are made with respect to the working of the patents when granted, to keep them in force. Hitherto this provision, for working, which is to be found in some shape or other in nearly all the continental patent laws, has been the source of great hardship to foreign patentees; but the provision is now modified to meet their case, and is only sufficiently stringent to prevent the obstruction of Belgic enterprise, by the continuance of patents which were never intended by their owners to be worked in that rapidly advancing country.

Leopold, King of the Belgians :—*To all whom these presents shall come, greeting. The Chambers have adopted and we sanction what follows :—*

Art. 1. Exclusive and temporary rights, entitled Patents of Invention, improvement, or importation, shall be granted for any discovery or improvement susceptible of being worked as an object of industry or commerce.

Art. 2. Patents shall be granted, without any previous examination, at the risk and peril of the petitioners, without guarantee, either of the reality, novelty, or merit of the invention, or the correctness of the description, and without prejudice to the rights of other parties.

Art. 3. The duration of patents is fixed at 20 years, except in the case provided for in Art. 14. Protection will commence from the day of the preparation of the certificate or memorandum mentioned in Art. 18.

There shall be paid for each patent an annual progressive duty as follows:—

For the 1st year........ 10 fr.
„ 2nd „ .... 20 „
„ 3rd „ .... 30 „

and so on up to the 20th year, for which the duty shall be 200 francs. The duty must be paid in advance, and will in no case be refunded.

No duty will be required on patents of improvement when they shall have been granted to the patentee of the original patent.

Art. 4. Patents confer on their proprietors or assignees the exclusive right:—

a. Of working, for their benefit, the patented object, or of causing it to be worked under their licenses.

b. Of proceeding, before the tribunals, against infringers of their rights, either by the manufacture of products, or the employment of means comprised in the patent, or by detaining, selling, exposing for sale, or introducing into the Belgian territory, one or more counterfeit articles.

Art 5. If the persons proceeded against by virtue of Art. 4, sec. *b*, have acted knowingly, the tribunals shall pronounce the confiscation, for the benefit of the patentee, or parties empowered by him, of the articles manufactured in contravention of the patent, and also of the instruments and utensils specially intended for the manufacture of the same; or the tribunals shall award a sum equal to the price of the articles already sold.

When the persons proceeded against have acted in ignorance, the tribunals shall forbid them, under the above penalties, from employing, for commercial purposes, the machines and apparatus proved to be infringements, and from using, for the same purpose, instruments and utensils for the production of the patented articles. In either case, damages may be awarded to the patentee or his representatives.

Art. 6. The proprietors of patents, or persons empowered by them, may, with the authorization of the President of the *Tribunal de Première Instance*, obtained upon petition, prepare, with the assistance of one or more experienced persons, a description or inventory of the apparatus, machines, and articles, alleged to be infringements.

The President may, by the same order, forbid the removal of the said articles, and empower the patentee to nominate a custodian, or even to put the articles under seal. This order will be signified by an officer appointed for that purpose.

Art. 7. The patent shall be annexed to the petition, which shall contain an election of domicile in the commune where the

inventory or description is to be taken. The experienced persons nominated by the President shall make oath before him prior to commencing their operations.

Art. 8. The President may require the patentee to give security. In such case, the order of the President shall not be delivered in the absence of proof of this regulation having been complied with. Security shall always be required from foreigners.

Art. 9. The patentee may be present at the preparation of the description or inventory, if specially authorized by the President of the Tribunal.

Art. 10. If the doors are closed, or in case of refusal to open them, proceedings shall be taken conformably with Art. 587, of the Code of Civil Process.

Art. 11. A copy of the description or inventory of the counterfeit articles shall be left with the person holding the same.

Art. 12. If the act of taking the description be not followed within eight days by a citation before the tribunal in the district in which it has been effected, the order made in conformity with Art. 6, shall become utterly void; and the person holding the articles described may require the remission of the original memorandum or certificate, with prohibition to the patentee from making use of its contents, and from rendering it public,—the whole without prejudice to any damages.

Art. 13. The tribunals shall take cognizance of matters relative to patents, as of summary and urgent affairs.

Art. 14. The author of a discovery, already patented abroad, may either obtain personally, or by his representatives, a patent of importation in Belgium. The duration of this patent shall not exceed that of the patent previously granted abroad, and shall, in no case, exceed the limit fixed by Art. 3.

Art. 15. In case of modifications being made in the invention, a patent of improvement may be obtained, which shall expire at the same time as the original patent.

If, however, the proprietor of the new patent be not the original patentee, he cannot, without consent of the latter, make use of the original discovery; nor can the original patentee work the improvement without the consent of the proprietor of the new patent.

Art. 16. Patents of importation and improvement confer the same rights as patents of invention.

Art. 17. Whoever wishes to obtain a patent, must deposit, under seal, in duplicate, at the registry office of one of the provincial prefectures of the kingdom, or at the office of a commissariat of arrondissement, according to the formalities which shall be determined by a royal decree, a clear and perfect description, in one of the languages used in Belgium, and a correct drawing, on a metrical scale, of the subject matter of the invention.

No deposit of papers shall be received without the production of a receipt verifying the payment of the first year's tax on the patent.

A memorandum or certificate, entered free of expense by the provincial registrar, or by the commissary of arrondissement, in a register kept for that purpose, and signed by the petitioner, shall verify each deposit,—setting forth the day and hour of the deposit of the documents.

Art. 18. The legal date of the invention is verified by the certificate, which shall be prepared on the deposit of the application for the patent. A duplicate of this certificate shall be delivered without expense to the applicant.

Art. 19. A decree of the Minister of the Interior, verifying the completion of the prescribed formalities, shall be delivered, without delay, to the applicant, and shall constitute his patent. A copy of this decree shall be inserted in the *Moniteur*.

Art. 20. The descriptions of patents granted shall be published, either in full or in substance, by the government, in a special publication, three months after the date of the grant of the patent. When the patentee shall require the publication, in full, or of an extract furnished by him, this publication shall be effected at his expense. After the same term the public shall be also allowed to inspect the descriptions, and copies of the same may be obtained on payment of the expenses.

Art. 21. Every conveyance or assignment of a patent, by deed or by will, shall be registered at a fixed duty of 10 fr.

Art. 22. The patent shall be utterly void in case of non-payment, within the month of the expiration of the term, of the duty fixed in Art. 3. This avoidance shall be published in the *Moniteur*.

Art. 23. The proprietor of a patent must work, or cause to be worked, the patented invention in Belgium, within a year from the date of its being worked abroad. The government may, however (on cause being shewn), by a royal decree inserted in the *Moniteur*, before the expiration of this term, grant an extension of not more than one year.

At the expiration of the first year, or of the extension which shall have been granted, the patent, if not worked, shall be annulled by royal decree.

The patent shall also be declared void when the patent, being worked abroad, shall have ceased to be worked in Belgium during a year, unless the proprietor of the patent shall shew good cause for his inaction.

Art. 24. The patent shall be declared void by the tribunals, for the following causes:—

a. When it shall be proved that the object patented has been employed or put in operation by any other person within the kingdom, for commercial purposes, before the legal date of the invention, importation, or improvement.

b. When the patentee, in the description annexed to his petition, shall have intentionally omitted to make mention of a part of his secret, or shall have indicated it incorrectly.

c. When it shall be proved that the complete specification and correct drawings of the object patented were printed and published prior to the date of deposit; unless, as respects patents of importation, this publication shall be exclusively the consequence of a legal prescription.

Art. 25. A patent of invention shall be declared void by the tribunals, in case the object for which it was granted shall have been previously patented in Belgium or abroad. If, however, the petitioner possess the qualification required by Art. 14, his patent may be maintained as a patent of importation, according to the terms of the said article.

These regulations may be applied, if necessary, to patents of improvement.

Art. 26. When the avoidance of a patent shall have been pronounced, according to the terms of Arts. 24 & 25, by a judgment or decree, which shall have acquired the force of an affair adjudicated upon, that avoidance shall be proclaimed by a royal decree.

Art. 27. Patents which shall neither have expired nor become void at the time of the publication of the present law, shall continue to be governed by the law in force at the time of their being granted. Nevertheless, the patentees shall be at liberty, within a year from this publication, to make a fresh application for a patent, in the form which shall be determined by royal decree. In this case, the patent may continue in force during the time necessary to complete the term of 20 years, with the exception set forth in Art. 14. Patents for which this privilege shall have been applied for, shall be governed by the present law; but, proceedings commenced before its publication, shall be terminated in conformity with the former law.

The proprietors of these patents who shall have paid the whole of the first duty, shall, after the expiration of the term for which their patent had been first granted, pay the duty appertaining to the following years, in accordance with the provisions of Art. 3.

With respect to the proprietors of patents who shall not have paid the duty fixed as the price of the original patent, an account shall be taken of the payments which they have already made; and the annual payments shall be regulated according to the payments made, in conformity with Art. 3.

We promulgate the present law, and order that it be sealed with the seal of the State, and published in the *Moniteur*.

Given at Laeken, 24th May, 1854.

By the King. LEOPOLD.

The Minister of the Interior,
F. Piercot.

Seen and Sealed with the Seal of the State.
The Minister of Justice,
Ch. Faider.

INSTITUTION OF CIVIL ENGINEERS.

April 25th, 1854.

The discussion was resumed on Mr. D. K. CLARK'S "*Description of the deep sea fishing steamer 'Enterprise,' with Ruthven's propeller.*"

In allusion to the former experiments, it was shewn that the power required for the propulsion of the "Enterprise," at $9\frac{1}{2}$ miles per hour, was 35 indicated H. P., as estimated by Bourne's formula for resistance, founded on the results obtained by the "Rattler:" this power was nearly what was stated in the paper (40 H. P.); with which also the stated consumption of fuel was in accordance.

It was argued, with respect to the supposed loss of power in communicating to the water the velocity of the vessel, that inasmuch as the action of the propeller was, in principle, the same as if the intercepted water was raised to the height due to the velocity imparted to it, the velocity was only lent to the water, and ready, in virtue of that head, to be refunded when required; and that the necessary engine-power was equal to that which could raise the quantity of water, required for propulsion, from the level of the sea to the height due to the velocity of efflux. On these principles it was calculated, from the data contained in the paper, that in the management of the water, exclusive of all frictional resistance, the ratio of power to effect was—

The power used	=	12·28 H.P.
Ditto wasted	=	3·94 do.
Total - -		16·22 do.

The statements as to the former experiments were reiterated, viz., that the power required to communicate velocity to the water passed through the propeller, was not afterwards utilized. For supposing a ball to be suspended over the vessel, at a height due to the velocity of the vessel, and moving at the same rate—it was urged, that to raise the ball to that height, and to communicate to it the velocity, would obviously require just double the power necessary to raise it. Assuming the ball to be detached, it would descend vertically, as regarded the vessel, and would act upon it precisely as it would if both the ball and the vessel were at rest. As a consequence, therefore, it would only act with the effect due to the height from which it fell.

As another illustration:—it was assumed, that the deck of a vessel was level with the surface of the surrounding medium, and that a given portion of fluid was transferred from the medium to the level of the deck; then a certain amount of power would be expended in changing the condition of the water and imparting to it the velocity of the vessel; but as this water would only be at the level of the surrounding medium, it would not flow out

again, and the power that had been absorbed would not be again utilized.

It was contended, that the inference from the experiments quoted, viz., that the pressure was double the hydraulic height due to the velocity, was incorrect; for the pressure was measured upon the reduced section of the *vena contracta*, which was only $\frac{5}{8}$ths of the area of the real aperture, upon which area, as had been shewn, the unbalanced pressure should be estimated; and it was contended, that the contrary inference led to inconsistent and anomalous results. But in no respect did these experiments apply to the case of water passing through a tube, or pipe, beyond the *vena contracta*, as the area of unbalanced pressure would then be immediately reduced.

Referring to the experiment quoted in the paper, and assuming the possibility of the reaction pressure being equal to double the height due to the velocity, viz., 23 feet per second; *i. e.*, $= 8\frac{6}{10}$ths feet; then double that would $= 17\frac{2}{10}$ths feet $+ \frac{9}{10}$ths feet (the height of the issue above the sea) would give a total height of $18\frac{1}{10}$th feet; this $\times$ 25 feet (the quantity of water per second) and $\times$ into 60 (seconds per minute) and $\div$ 528 feet (the quantity of water raised one foot high per minute per horse power) gave 51 H.P.; then adding to that the loss from the friction of the water in the passages, as stated in the paper, together with the friction of the engine itself, it would appear that the power applied must have been $=$ 80 H.P. instead of 40 H.P. as stated, and thus shewing that the experiment and the inference could not be reconciled.

Again, it was argued, that the useful effect was expressible, simply by the difference of the power consumed, in giving to the water the speed of the vessel, and the power in expelling it: that, in the admission and in the expulsion of the water, reacting pressures, measured by twice the head due to the velocities of admission and expulsion, were exerted longitudinally upon the vessel; the difference of these reacting pressures expressing the useful effect. Putting V for the speed of the boat, and V′ for the effluent velocity of the water, with respect to the nozzles from which it issued; then, the power expended being taken as unity, the useful effect was found to be represented by

$$2\,V\frac{V - V}{V'^2}$$

which shewed, that when the forward speed of the vessel and the effluent speed of the water were equal, there was no useful effect; and that the maximum useful effect was obtained when the effluent speed of the water was twice the speed of the vessel, and when the useful effect was just one-half of the power expended, exclusive of the friction resistance. Whereas, with the paddle or screw, there did not appear, theoretically, any limit to the ratio

of the efficiency,—it might be equal to the power,—and, in practice, it was limited only by the extent of surface which it was convenient to give to the paddle-board, or to the screw. Still, the amount of power obtained by the jet was less affected by deviations from the most useful velocity, than in the case of the paddle or the screw; and there might be found to be practical advantages, which would render the plan of the jet very advantageous in numerous cases.

With respect to the unbalanced pressure of reaction, by the flow of water through the side of a vessel at rest, it was argued, that all attempts to explain the subject by reference to hydrostatic principles, were fallacious, and that experiment alone could determine the results.

A recent experiment on the reaction pressure was also described. A cylinder was fitted with a jet-pipe in the side, at the bottom of the form of the *vena contracta.* It was suspended from a considerable height, so as to hang freely, and was filled with water, which was kept up to a constant level: when the water was permitted to flow out freely, an unbalanced pressure, of one and a half the hydrostatic pressure under that head, was indicated on a balance, applied against the opposite side, as measured on the small section of the *vena contracta.*

With respect to the formula, shewing that the maximum useful effect was only half the power expended, it was considered, that the conditions of the formula did not meet the case of the propeller, for it was assumed, that the engine-power was available only for expelling the water, and that the mass of the vessel necessarily discharged the duty of taking up the water. Now, the facts were stated to be, that the machine not only discharged the water, but it also previously drew it into the vessel by exhaustion; and it was contended, that, under these circumstances, the maximum effect was obtained, when the speed of the vessel was equal to that of the effluent water, and amounted to 100 per cent. of the engine-power, minus friction resistances.

In fine, though much difference of opinion was expressed, as to the mode of action and the economy of Ruthven's propeller, it was agreed, that in numerous situations, the new propeller might be found to possess practical advantages over the paddle and the screw; and that the subject demanded further inquiry and investigation, theoretically and experimentally.

May 2nd, 1854.

The paper read was "*On water-meters.*"—By Mr. D. Chadwick.

The author commenced by shewing the long-experienced want of a good system of ascertaining the quantity of water delivered by water companies to private houses, public establishments, or manufactories, direct from the pipes, without the intervention of cisterns, and under the varying pressures of high and low service, or under the circumstances of intermittent or constant supply.

The paper gave a list of the patented water meters, from 1824 to 1853, and then proceeded to explain, succinctly, the several systems hitherto employed, under the several classifications of,—

1st. The diaphragm principle.

2nd. The water-wheel,—the turbine,—the spiral fan,—the drum,—and their various modifications.

3rd. The piston and cylinder.

Of the first-class, the machine of Mr. Parkinson appeared to have been most approved; but it was deficient in sensibility, was accompanied by a noise from the tumbling lever and weight, and was very liable to derangement from wear and tear.

The second class was the most numerous; and among the machines described were those of Mr. Taylor, Mr. Siemens, Messrs. Siemens and Adamson, and Captain Ericsson; which were considered the best. All these acted upon the principle of registering, by the pressure of the water against the vanes of a circular drum, or of a spiral screw, or of a fan. In practice, they were all found to permit small quantities of water to pass continuously through the meter, without registration, in consequence of a certain amount of force being required to overcome the resistance offered by those parts of the meter in connection with the counting apparatus, before motion could be given to it. An attempt had been made by Mr. Taylor to remedy this defect, by using a gutta-percha drum of the same specific gravity as water; but though the meter, thus arranged, measured correctly under full pressure, it varied much when either the inlet or the outlet pipe was partially closed.

Mr. Siemens' inventions were well spoken of for their ingenuity; but the defect above-mentioned equally applied to them.

Captain Ericsson's rotary fluid meter was shewn to bear a close resemblance to that of Mr. Taylor, and to be liable to the same objections.

The reciprocating fluid meter, also by Captain Ericsson, was shewn to have been used, to some extent, in the United States, and to be more effective in its action.

Messrs. Donkin and Co.'s meter, on the principle of the disc engine, possessed a certain degree of merit, but it had not hitherto been rendered practically efficient.

The machines in ordinary use being generally defective, the want was in some degree supplied by the patented water meter of Messrs. Hanson and Chadwick, of Salford.* It consisted of a vessel of metal, into which the fluid entered, by a pipe at the bottom, through a wire gauze, to prevent the admission of silt or other extraneous matter: it then passed into two semi-circular bags of vulcanized caoutchouc, firmly fixed on a level bed; one end of each bag opening into the meter. Upon these bags rested three conical metal rollers, attached to a central shaft, which was connected with ordinary registering wheels and dials. The water, on passing into the bags, propelled the rollers round continuously;

* For specification of this patent, see p. 413, *ante*.

each revolution registering exactly the contents of the bags. The rollers worked in the water, under the same pressure as in the pipes, which was in fact continued throughout; and, at its exit from the meter, the water did not exhibit any appreciable loss of pressure.

In the discussion, many water-meters were referred to, and, among them, the various measuring machines introduced by Mr. Siemens, were described. It was shewn, that although a single screw, suspended in a current of water, might allow a considerable quantity of fluid to pass unmeasured, at low velocities, that defect had been counteracted by the addition of a second screw, working in the opposite direction, and by a general equalibration of the working parts. That meters of this description had been found to measure water with great accuracy, at all speeds above one per cent. of the maximum speed; but had failed, after working during a period of from six to fifteen months, in consequence of the inevitable abrasion of the spindles working under water. To obviate this serious difficulty, which applied equally to piston and to diaphragm meters, the more simple contrivance of a form analogous to that of a Barker's mill, was adopted. The water entered the rotating disc of this meter through a contracted funnel, and, spreading outward, issued through tangential apertures into the surrounding casing. Inasmuch as the outlets would act, to some extent, in the manner of jets, this drum would revolve proportionately faster at high velocities; to counteract which, upright blades were attached to the same revolving portion; giving a resistance in the water, increasing as the square of the velocity. A uniform ratio, within the limits of two per cent., was thus practically obtained. The only step or bearing of this meter was effectually protected from the water by forming a closed oil chamber at the bottom of the disc, into which there entered an upright stud with a steel point, abutting against a steel plate at the bottom of the chamber. In like manner, the reducing wheels of the counter were enclosed in a sealed oil chamber. Out of 300 meters on this plan, which had been in constant operation, under the most varied circumstances and pressures, for about twelve months, not one had failed in the working parts. It was contended, that as the machine had ample power to overcome extraneous resistances, and as the friction had been reduced to a minimum, variations in that friction would not affect the measurement to any sensible degree. The advantages of this meter were, its compactness, cheapness, and general applicability either to waterworks' purposes, or to measure the water pumped into steam-boilers.

CARR'S RAILWAY CROSSING.

After the meeting, Mr. Carr (M. Inst. C.E.) exhibited models of his improved patented railway crossing*. The chief deviation

* For specification of this patent see p. 285, Vol. 44.

from the form of the common crossing appeared to consist in filling up the hollow on the inside of the wing-rails, so as to afford support to the part where the wheels bear partially on them, and thus to preclude the possibility of shearing off the overhanging flange,—which was stated to occur frequently with ordinary crossings. The point rails were similarly filled, and also blocked out, so as to render the point one solid piece, of much greater strength than usual. The joint of the point-rails, being on a chair, appeared to obviate the necessity of bolting the rails together, whilst it dispensed with the splice-joint of the ordinary construction.

A loose block was also introduced between one wing-rail and the point, in each of the point-chairs: this alteration allowed the wing-rail, the loose block, and the point, to be all wedged firmly in the chair by one key.

It was shewn, that although the upper surfaces of the filled wing-rails and the solid point might be worn down, they could not be crushed; and the deficiency of metal which might be produced by wear, could be easily restored, by heating the rail, and slightly hollowing the side; whereas, in the common crossing, the overhanging flange being liable to be sheared off, or crushed, entirely destroyed the rail: so that in the one case a few shillings would restore the crossing, whilst, in the other, it was entirely destroyed, and must be replaced by a new one.

May 9th, 1854.

The paper read was "*A description of the sliding caisson, at Her Majesty's Dockyard, Keyham, Devon.*"—By Mr. W. FAIRBAIRN, M. Inst. C.E.

The substitution of caissons, for the ordinary lock-gates, and their employment for closing the wide entrances of docks, have been somewhat extensively used, although the objections of occupying a considerable time, in having the water pumped out of them, and it being necessary to float them entirely away from the opening, before a vessel could pass, rendered them applicable only for special localities. The great width of opening required for the passage of ships of war, induced a rather general use of such caissons in the royal dockyards; and at the new dockyard at Keyham, where is was considered desirable to have the best accommodation for the newest class of large ships, the great breadth of the mouth and depth of the basin, induced the trial of a new form and arrangement of caisson, which should be of such capacity and dimensions as to resist the pressure of the water, effectually close the entrance, and still be so easy of manipulation as to admit vessels of war passing into the dock at any state of the tide.

The Keyham Docks were commenced in 1844, and they consisted principally of two capacious basins, with several entrances,

or locks, from the sea. One of these, it was thought desirable to construct in such a manner, as to have the power of using it, when necessary, for a dry dock: its dimensions were 260 feet long, 80 feet wide, and 43 feet deep. The inner end, next the dock, was closed by a caisson of the ordinary form, and at the outer end, next the channel, the new caisson was tried.

The form of the caisson was that of a rectangular vessel, 82 feet 6 inches long at the top, 68 feet 6 inches long at the bottom, 42 feet high, and 13 feet 6 inches wide. It was built of wrought-iron plates, varying in thickness from $\frac{5}{8}$ths inch at the bottom, to $\frac{3}{8}$ths inch at the top; well supported throughout by an inside frame-work of angle-iron, and gusset-pieces, and by two decks of iron and one of timber for the interior arrangements; but which, at the same time, imparted great strength to the structure.

The plates were conncted by "butt-joints," with covering plates, attached by double and quadruple rows of rivets; and the bottom and ends were clothed with oak timber which bedded upon the cill, and against the jambs, when the caisson was in its place. The internal arrangements of the caisson were such, that when it was required to withdraw it from across the opening of the lock, by merely opening a valve, a sufficient quantity of water escaped from the upper chambers, to allow the body to rise a few inches from the bottom cill; when, instead of, as in the ordinary system, turning it round and floating it away, it was drawn back, by chains, transversely into a channel or opening in the masonry, at right angles with the lock,—leaving an opening of the clear span: and after the passage of the ship, it was drawn across again, and, by opening another valve, as much water entered as settled it securely on its bed or cill. This operation was stated to have occupied only eighteen minutes, for the passage of a line-of-battle ship; ten minutes for opening and eight minutes for closing. The total weight of the caisson was shewn to be 290 tons: it contained 33 tons of iron ballast, and had an internal capacity for 323 tons of water. The mechanical arrangements were minutely described, and the general result appeared to have been very successful; and from the tabular statement of the deflection of the caisson, under the pressure of various depths of water, the structure appeared amply strong for resisting either the dead pressure, or the concussions of the waves, which frequently beat heavily against the entrance of the docks.

May 16th, 1854.

The paper read was, "*On the fatigue, and consequent fracture of metals,*" by Mr. F. Braithwaite, M. Inst. C.E.

Many accidents, the causes of which had been pronounced *mysterious*, having professionally engaged the author's attention, he had carefully examined the circumstances of each, and

the condition of the fractured metal in all cases; and at length arrived at the conclusion, that almost all the accidents might be ascribed to a progressive deteriorating action, which might be termed the "fatigue" of metals.

Metal in a state of rest, although sustaining a heavy pressure, or strain, as in a beam, or girder, and exhibiting only the deflection due to the superposed weight, would continue to bear that pressure, without fracture, so long as its rest was not disturbed, and the same strain was not too frequently repeated; but if either of these cases occurred, a certain disturbance of the particles took place, the metal was deteriorated, and that portion subject to the reiterated strain, was so far destroyed that it ultimately broke down. This might also arise from sudden concussions, when the metal was under a certain strain; and those concussions might be caused by the girder being suddenly unloaded.

Several examples were given of accidents of the kind that had been alluded to; for instance, that of a vat in a London brewery, carried on cast-iron girders, by which it had been supported for some years; but suddenly, without any apparent cause, they broke, and killed and wounded some workmen. In this case, it was shewn that the girders were not originally sufficiently strong for the load, and therefore the intermittent load of the vat, which was sometimes full, and at other times only partially so, and then empty, caused a constantly-recurring deflection, and a subsequent corresponding effort to regain its natural position, by which the composition of the metal was disturbed, and fracture ensued.

Other examples of the same nature were given; and it was shewn, that the repeated buckling of the tube-plate of a locomotive, arising from the action of the pistons, had a tendency to cause fracture mechanically; and also that the side-strains and vibrations to which the suspension-rods of the ash-pans of locomotives were subjected, had produced very serious results, which it sufficed to point out forcibly, to guard against the recurrence of.

The author contended, that, presuming adequate dimensions to have been given to girders, and the stipulated weight not to have been exceeded, the chances of accident were remote; but that any repeated deflection, either at intervals, or continued for so long as to induce a permanent depression, must be productive of danger, which could only be averted by altering or replacing the parts deficient in strength, and maintaining a rigid supervision, whether of beams when loaded, or of parts of machinery, or of railway stock after working. By such means accidents would be prevented, and a greater degree of confidence be established in structures in which metal was employed.

Scientific Adjudication.

Before Vice-Chancellor Sir W. P. Wood.

May 26th, 1854.

TALBOT *v.* HENDERSON.

Mr. Rolt, Q.C., and Mr. E. F. Smith, moved on behalf of the plaintiff, Mr. William Henry Fox Talbot, the inventor of the process for taking photographic portraits, known as the "Calotype" or "Talbotype" process (for which invention he obtained letters-patent, in 1841, for fourteen years), to restrain the defendant, who is a photographic artist carrying on business in Regent-street, and also in the Strand, from in any manner using, exercising, or putting in practice the invention of the plaintiff, or any part thereof, or counterfeiting, imitating, or resembling the same, or any part thereof, in the preparation of portraits, and from obtaining, making, manufacturing, preparing, or selling any photographic portraits on paper, according to, or by means of the plaintiff's said invention, or any part thereof. The nature of the invention, as set forth in the specification, consisted of several parts, the first of which was a method of preparing paper so as to make it extremely sensitive to the rays of light. The paper has to undergo two processes for this purpose; by the first of which it becomes strongly sensitive to light, but may be put away in a portfolio, or elsewhere, without injury to its properties. In this state it is called iodized paper. By the next process, which is adopted immediately before it is required for use, it is rendered still more highly sensitive to light. This is done by means of washing the "iodized" paper over with a chemical preparation, termed by the plaintiff gallo-nitrate of silver, and which is composed of a mixture of crystallized nitrate of silver, dissolved in water, mixed with strong acetic acid and a solution of crystallized gallic acid. The specification described the obtaining of negative images upon this paper, so prepared (and which is then called "calotype" paper), by means of a camera, and then transferring these negative images into positive ones, and fixing them with a solution of bromide of potassium. The positive images, thus taken, may be either on calotype paper, or on common photographic paper. The latter is the longer process, but the tints produced are more harmonious and agreeable. The claims made by the plaintiff in his specification were as follows:—First, the employment of gallic acid or tincture of galls in conjunction with a solution of silver, to render paper—which had already received a previous preparation by washing with a solution of crystallized nitrate of silver, and dipping in a solution of iodide of potassium—more sensitive to the action of light. Secondly, the making visible photographic images upon paper,

and the strengthening such images, when already faintly or imperfectly visible, by washing them with liquids which would act on those parts of the paper which had been previously acted on by light. Thirdly, the obtaining portraits from life by photographic means upon paper. Fourthly, the employing bromide of potassium, or some other soluble bromide, for fixing the images. In the year 1852, on the suggestion of the Earl of Rosse, President of the Royal Society, and Sir Charles Eastlake, President of the Royal Academy, as contained in a joint letter written by them, the plaintiff, in his reply, agreed to offer his patent as a free present to the public, with a view of inviting the emulation and competition of artists and amateurs; but he reserved to himself the application of the invention to taking photographic portraits for sale to the public. These letters were afterwards published by authority in "The Times," and other papers, in the month of July, 1852; previously to which the plaintiff had obtained an injunction, granted by the late Vice-Chancellor Sir James Parker, restraining certain parties from infringing the patent in question. It was alleged by the bill, that the defendant had been manufacturing and selling large numbers of photographic portraits, pictures, or representations of objects on paper prepared according to, and by means of, the plaintiff's invention, and others on paper, which were intended to counterfeit, imitate, or resemble the invention, in breach of the letters-patent, and without any license from the plaintiff; and, on these grounds, the injunction was now applied for. Affidavits were made in support of the motion by Sir David Brewster, Sir John Herschel, and others: in answer to which, affidavits were filed on behalf of the defendant, who altogether disputed the originality of the plaintiff's invention, and alleged, moreover, that he did not produce his negative images by means of paper prepared with gallic acid, but by what is known as the "collodion" process. This process appeared to consist in the use of a plate of glass with a film or skin upon it, prepared from gun-cotton, or paper which, from having been steeped in acid and washed in water, became soluble in ether, and might be poured upon the glass, and thus produce a result which the plaintiff, however, contended was the same as the iodized paper used by him. The defendant also contended, that he did not use gallic acid, and that the plaintiff's patent was not good, inasmuch as it claimed the use of gallic acid, which was no novelty.

Mr. Fooks appeared in opposition to the motion.

The Vice-Chancellor, without calling for a reply, said it was quite clear that there was a serious point to be tried at law between the parties. He should grant the injunction—but he felt some doubt as to that part of the order which asked to restrain the defendant from imitating and resembling the plaintiff's invention, "or any part thereof."

Mr. Rolt said those words had been copied from the order

made in a similar case before the late Vice-Chancellor, Sir James Parker, and they also were the very words used in the patent.

The Vice-Chancellor thought that if that were so, the words "or any part thereof" must stand as part of the order. Mr. Talbot had certainly, in terms, described his whole process as one that was applicable on paper, in the first instance, to be prepared in a particular way, and rendered highly sensitive to the action of light in the mode he described. Secondly, he claimed, as his invention, the power of producing a visible photographic impression upon paper by washing it with liquids, so as to enable it to be beneficially acted upon by light; but the specification only described one liquid, and did not say, as was commonly said, he used that among other ingredients, but that that particular one was the one that he preferred. He claimed, thirdly, the invention of obtaining portraits by light, and by photographic means, upon paper. He claimed, fourthly, the merit of fixing it upon the paper by bromide of potassium. He (the Vice-Chancellor) did not think that any question arose upon that last claim. But a question had been raised by the defendant as to whether the "collodion" process (which, in some affidavits, was stated as being gun-paper or gun-cotton dissolved in ether, and spread, as a thin film, over glass) was an infringement of the patent; and it was a matter of dispute how that film could be made chemically more sensitive, so as to develope the image. The one side stated that it might be done by a particular preparation of iron, or by pyrogallic acid (which was only another form of gallic acid); and the other, that it was done by a totally distinct substance. The defendant did not say which his process was; and he had a right to require the plaintiff to prove a case against him. He said, indeed, that he did not use gallic acid. But it was said, that as pyrogallic acid was a modification of gallic acid, although not gallic acid strictly so called, it might be a question for discussion whether a process had not been used which might be an infringement of the patent, and that whether the claim was for substitution of collodion for paper, or rendering it sensitive by pyrogallic or by gallic acid. In cases where a process had been invented, and an improvement had been made upon that process, the original patentee could not use the latter; nor could the party improving use the original process without permission of the original patentee. They must make such arrangement as they best could. In the present case Mr. Talbot had been in possession of the patent for 13 years, and had granted numerous licenses. That gave him a *primâ facie* title. There was sufficient, however, before the Court, to shew that an action must be tried as to whether there had been an infringement. Upon the question of convenience or inconvenience of granting an injunction, the evidence preponderated in favor of the plaintiff's having the injunction; because, if the defendant was permitted to make these photographic impressions, all others would have a right to do the

same. The defendant ought to be enjoined, following the terms of the injunction granted in a former case by Vice-Chancellor Sir James Parker.

Mr. Fooks then asked that a condition might be imposed upon the plaintiff of making compensation to the defendant, if he failed in the action.

The Vice-Chancellor acceded to this suggestion, and directed that the action should be brought forthwith, with liberty to apply.

LIST OF GRANTS OF PROVISIONAL PROTECTION.

[*Cases in which a full Specification has been deposited.*]

1854.

870. William Ridgway, of Hanley, for improvements in the construction of ovens and kilns.—[*Dated April* 15*th.*]

1086. Frederick East, of Warminster, for taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are seen, and the light and the time of exposure regulated.—[*Dated May* 15*th.*]

[*Cases in which a Provisional Specification has been deposited.*]

1853.

2911. Aignan Bernard Callier, of Paris, for certain improvements in the manufacture of umbrellas and parasols.—[*Dated December* 15*th.*]

1854.

187. John Petrie, jun., of Rochdale, for certain improvements in apparatus for drying wool after it has undergone the process of washing or scouring.—[*Dated January* 25*th.*]

322. William Dray, of Swan-lane, London, for improvements in the construction of portable farm and other buildings; part of which improvements are applicable to the construction of cart and waggon bodies, and other structures.—[*Dated February* 10*th.*]

499. John Baptiste Gottung, of Hawley-place, Kentish-town, for embroidering on leather for harness, and other purposes,—being a communication.—[*Dated March* 1*st.*]

527. Charles De Bergue, of Dowgate-hill, for improvements in apparatus for bearing and buffing purposes. [*Dated March* 4*th.*]

533. David Barr, of Sudbrook Park, Richmond, for an improved combined hair-brush and comb.—[*Dated March* 6*th.*]

549. James Charles Edington, of Leicester-square, for working machinery, propelling vessels, and firing guns.—[*Dated March* 8*th.*]

588. James Cooper Hall, of Monk Wearmouth, for an improved windlass.
594. James Jones Aston, of the Middle Temple, for improvements in the construction of envelopes.

The above bear date March 11*th.*

616. Peter Armand le Comte de Fontainemoreau, of South-street, for improvements in heating apparatus,—being a communication.—[*Dated March* 15*th.*]
655. Edward Esnouf, Charles Mauger, jun., and George Washington Lewis, all of Jersey, for improvements in portable dwellings and vehicles for travellers or emigrants.—[*Dated March* 20*th.*]
695. John Jeyes, of Northampton, for the manufacture of pulp from twitch or couch grass.—[*Dated March* 24*th.*]
701. Thomas Gibson and William Knighton, both of Staveley Works, Chesterfield, for improvements in moulding and casting metals.
702. Thomas John Smith and Joseph Smith, both of Queen-street, Cheapside, for improvements in the manufacture or construction of pocket-books, portfolios, and similar articles.
703. William Adolphus Biddell, of Great Sutton-street, for improvements in alarums and signals to be used in or on railways, ships, houses, buildings, plantations, or other places, for the purpose of giving audible or visible signals in cases of danger or alarm.
704. George Beaumont, of Halifax, Yorkshire, for improvements in machinery or apparatus for the manufacture of solid, hollow, and ornamental bricks.

The above bear date March 25*th.*

705. Arthur Edward Forty, of Kennington, and William Haines, of New Kent-road, for a new composition of materials suitable for mouldings and for most purposes for which leather and gutta-percha have been or may be employed.
706. Henri Adolphe Archereau, of Paris, for certain improvements in treating powders of charcoal, coke, coal, peat, and generally all matters obtained by the carbonization of mineral, vegetable, and animal substances, and in applying the said powders to useful purposes.
707. Alexander Prince, of Trafalgar-square, for an improved method of hardening fatty and oily matters employed in and for the manufacture of candles,—being a communication.
708. Frederick Phillips, of Downham, near Brandon, Suffolk, for improvements in machinery or apparatus for cutting, grating, or preparing vegetable substances.
709. James Alexander Manning, of the Inner Temple, for improvements in the treatment of sewerage.

The above bear date March 27*th.*

711. Joseph Hipkiss, of Birmingham, for a new or improved dress fastening.
712. John Woodward, of Acton-street, for certain apparatus for stopping shot and other holes in ships and vessels.
713. Henri Adolphe Archereau, of Paris, for certain improvements in galvanic batteries.
714. Alfred Hodgkinson, of Springfield Bleach Works, Belfast, for improvements in bleaching linen fabrics.
715. John Roberts, of Bruton-street, for improvements in the construction of cabriolets.
716. Henry Francis, of West Strand, for improvements in machinery for crushing, grinding, washing, and amalgamating quartz and other matters containing gold or silver.
717. William Hähner, of Leghorn, for improvements in the manufacture of muriatic and sulphuric acids,—a communication.
718. Frédéric Chambon and Alfred Meyniac, of Chaylard (Ardêche), France, for improvements in bleaching or scouring silk.
719. William Hähner, of Leghorn, for improvements in the manufacture of alkaline sulphites, and in purifying and treating gases,—being a communication.
720. Ellis Rowland and James Rowland, both of Manchester, for improvements in the manufacture of certain metallic springs.

The above bear date March 28th.

721. John Henry Johnson, of Lincoln's-inn-fields, for improvements in the construction of millwork and in the mode of driving the same; part of such improvements being applicable for transmitting motive power generally,—a communication.
722. Charles Barlow, of Chancery-lane, for certain improvements in the permanent way of railways,—being a communication.
723. Robert Henry Causton, of Battersea, for improvements in the manufacture of mill-bands.

The above bear date March 29th.

725. Jean François Lucevilliard, of Dijon, for improvements in fastening or sustaining to the body the various parts or objects of body clothing, equipment, and harnessing.
726. William Corrall, of Albert-street, Mile End, for constructing the several parts of vehicles of hollow metal tubing or pipes.
727. William Johnson, of Lincoln's-inn-fields, for improvements in galvanic, electric, and magnetic apparatus,—being a communication.
728. William Tucker, of Old Brompton, and William Adams, of Kensington, for preventing the escape of fuliginous smoke from shafts and flues.
729. Elmer Townsend, of Massachusetts, for an improvement in machinery for sewing cloth or other material,—being a communication.
730. Henry Cowley, of Oxford, for the manufacture of bricks (either solid, moulded, or perforated) by improved machinery.

731. John Sandys, of the Electric Telegraph Works, Upper Whitecross-street, for improvements in electric telegraph instruments.
732. Thomas Russell Crampton, of Buckingham-street, Strand, for improvements in crushing, washing, and separating ores and minerals.
733. Philip John Passavant and John Cure, both of Bradford, Yorkshire, for improvements in machinery or apparatus for combing wool and other fibrous substances.
734. William Simpson, of Birmingham, for improvements in apparatus for communicating alarm signals on railways.
735. Henry Young Darracott Scott, of Queen's-terrace, Woolwich, for an improved cement applicable as a mortar, or for moulding purposes.
736. Edward Cooper Willis, of Cambridge, for an improved mode of manufacturing gutta-percha into sheets.
737. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved construction of hone,—a communication.

The above bear date March 30*th.*

738. Jean Marc Gustave Coste, of Passy, near Paris, for revivifying animal charcoal that has already been used, and obtaining by a peculiar process prussiate of potasse or soda from it.
739. Archibald Douglas Brown, of Glasgow, for improvements in beds, couches, and other articles of furniture.
740. Henry Homewood and John Gregory, both of Mount-street, Lambeth, for an improved fire-escape.
741. Alfred Augustus de Reginald Hely, of Cannon-row, Westminster, for certain improvements applicable in exhibiting artistical, natural, or other objects, on a large scale.
742. William Edward Newton, of the Office for Patents, Chancery-lane, for an improved manufacture of carpet,—being a communication.
743. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for an improved mode of manufacturing carpets,—being a communication.

The above bear date March 31*st.*

744. Duncan Forbes, of Edinburgh, for improvements in facilitating a reference to books.
745. Frederick Samson Thomas, of Cornhill, for certain improvements in locomotive engines.
746. John Inshaw and James Parker, both of Birmingham, for an improvement or improvements in suppressing the smoke and increasing the draught of the furnaces of locomotive and other steam-engine boilers.
747. Sir Robert Juckes Clifton, of Clifton Hall, Nottingham, for an improved percussion shell.
749. Auguste Edouard Loradoux Bellford, of Castle-street, for a

new and useful fabric for boot and shoe soles, machine banding, and other purposes,—being a communication.

750. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for certain improvements in sewing machinery,—being a communication.

751. William Johnson, of Lincoln's-inn-fields, for improvements in the treatment or reduction of metallic ores and salts,—being a communication.

752. John Henry Johnson, of Lincoln's-inn-fields, for improvements in printing fabrics, and in the machinery or apparatus employed therein,—being a communication.

753. William Smith, of Witney, for an improved mop.

754. George Brockelbank, of Point Blackheath, for improvements in obtaining metals from ores.

755. William Kestell, of Burnham, Berkshire, for an improvement in fixing or cementing glass to metal.

756. George Fergusson Wilson, of Belmont, Vauxhall, and William Walls, of Glasgow, for an improvement in dyeing turkey-red.

The above bear date April 1st.

757. Thomas Scott, of Brighton, for improvements in machinery for propelling.

758. James Forsyth, of Caldbeck, Cumberland, for improvements in machinery for preparing and spinning wool and other fibrous substances.

759. Pierre Alexis Francisse Bobœuf, of Castle-street, for the application of electricity and fixed or moveable aerostation to military strategy and pyrotechny.

760. William Ashdown, of Piccadilly, for improvements in gas-stoves.

761. Richard Edward Hodges, of Southampton-row, for improvements in connecting wheels, drums, cylinders, and pulleys, with their naves, axes, and the parts thereof, one to the other.

762. William Gossage, of Widnes, for improvements in the manufacture of certain kinds of soap.

763. Giuseppe Devincenzi, of Grosvenor-street, for improvements in producing ornamented and figured surfaces, and surfaces for printing from; also the hardening or preparing of certain objects to be employed in the process.

764. Charles Walker, of Bury, for improvements in steam engines, and in apparatus applicable to safety-valves for steam-boilers.

The above bear date April 3rd.

765. John Gurney, of Bradford, Yorkshire, for an improvement in machinery or apparatus for spinning wool and other fibrous materials.

766. James Higgin, of Manchester, for improvements in the mode or method of separating metals from each other when in conjunction, and in obtaining useful products therefrom.

767. John Swarbrick, of Baxenden, near Accrington, for improvements in steam-boilers.

768. Joseph Bentley, of Liverpool, for improvements in breech-loading fire-arms.

769. Henry Seebohm, of Bradford, Yorkshire, for improvements in preparing and combing wool, goats' hair, alpaca, cotton, and other fibrous material.

770. George Seaborn Parkinson, of Westbourne Park-road, for improvements in railway brakes.

771. Bernhard Samuelson, of Banbury, for improvements in machinery for cutting turnips and other vegetable substances.

772. Robert Brisco, of Low Mill House, Saint Bees, Cumberland, and Peter Swires Horsman, of Saint John's, Beckermet, Cumberland, for certain improvements in heckling machinery.

773. Henry Young Darracott Scott, of Queen's-terrace, Woolwich, for an improved mode of manufacturing cement.

774. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improved machinery for raising and forcing fluids,—being a communication.

775. François Gustave Benôit Capouillet, of Brussels, for improved apparatus for generating heat by the combustion of bituminous or resinous substances,—being a communication.

776. James Edward Mc Connell, of Wolverton, for improvements in wheels, axle-boxes, and brakes for railway carriages.

777. John Hamilton Glassford, of Glasgow, for improvements in lithographic and zincographic printing.

The above bear date April 4th.

778. Henry Blatter, of Paris, for an improved mode of constructing thermometers.

779. William Gilpin, of Moorgate-street, for improvements in electrical communication.

780. George Ross, of Falcon-square, London, for an improved mode of preventing the alteration of bank bills from one denomination ot another,—being a communication.

781. William Edward Newton, of the Office for Patents, Chancery-lane, for improved apparatus for printing piece goods or fabrics,—being a communication.

783. Constant Bekaert, of Paris, for improvements in machinery for doubling, twisting, and winding flax, silk, cotton, hemp, wool, and other fibrous substances,—being a communication.

784. Jonathan Harlow, of the Bordesley Works, Birmingham, for improvements in the manufacture of metal bedsteads.

785. Stephen Randoll Smith, of Hanover-terrace, Bristol, for improvements in vessels and apparatus used for raising sunken vessels and other bodies in the water, and for lowering materials for structural purposes in water.

786. George Francis Wilson and James Monroe Whiting, of Rhode Island, for improvements in the manufacture of wood screws.

787. William Rumsey Gillard, of Kirby-street, Middlesex, for an improved method of coloring and ornamenting leather, vellum, book edges, paper, and other like substances employed in book-binding.

The above bear date April 5th.

788. John Weston, of Norwood, for improvements in transmitting and applying motive power for propelling railway trains, ships, boats, barges, and such like vessels, and for other useful and mechanical purposes.
789. James Smith, of St. Leonard's-on-Sea, for improvements in the construction of railways.
790. William G. Craig, of Newport, Monmouthshire, for an improved mode of making communications between the commander and the engineer, or the helmsman, or other person on shipboard.
791. Charles de Bergue, of Dowgate-hill, for apparatus for acting on water and other liquids, so as to force, displace, or propel the same or a body floating thereon.
792. Joseph Nash, of Thames-parade, Pimlico, for the manufacture and refining of sugar.
793. Simon O'Regan, of Liverpool, for improvements in engine-boiler furnaces and other furnaces.
794. Auguste Edouard Loradoux Bellford, of Castle-street, for improvements in sewing machines,—being a communication.
795. James Edward Boyd, of Lewisham, for improvements in the construction of ships' anchors.
796. Emile Dupont, of Boulogne-sur-Mer, for improvements in the manufacture of certain cements.
797. John Yule, of Port Dundas-road, Glasgow, for improvements in the machinery for raising minerals from mines.
798. Josef Chanes, of Davies-street, Berkeley-square, for an improvement in the manufacture of ribs of umbrellas and parasols, and of busks and substitutes for bones of stays and dresses.
799. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements in the construction of hot-air engines, —being a communication.
800. Julian Bernard, of Club-chambers, Regent-street, for an improved mode of stitching, or uniting and ornamenting various materials, and in machinery or apparatus for the said purpose.
801. James Worrall, jun., of Salford, for certain improvements in the method of bleaching fustians and other textile fabrics, and in the machinery or apparatus connected therewith.
802. John Henry Johnson, of Lincoln's-Inn-fields, for a revolving, blowing, and ventilating water extractor, for drying cloth,—being a communication.
803. William Richards, of Barcelona, for improvements in wet gas meters.

The above bear date April 6th.

804. Thomas Williams, of Manchester, and Samuel Ainley and Moses Mills, of Oldham, for improvements in machinery or apparatus for spinning cotton, wool, flax, or other fibrous materials.
805. Alfred Tylor, of Warwick-lane, for improvements in moderator lamps,—being a communication.
806. Henry Moss, of Mansfield-street, Cavendish-square, for an auriferous quartz washing, pulverizing, crushing, separating, and amalgamating machine.
807. Frederick Robert Augustus Glover, of Bury-street, St. James's for improvements in two-wheeled carriages.
808. Peter Armand le Comte de Fontainemoreau, of South-street, for certain improvements in the preparation of photographic paper,—being a communication.
809. Louis François Saugrin, of Paris, for improvements in the construction of stereoscopes.
810. Robert Harling, of Clerkenwell, for certain mechanical arrangements for multiplying power.
811. Jonathan Jopling, of Bishopwearmouth, for improvements in preserving the tuyere used for blowing in forge and other furnaces from the action of the fire.
812. William Henry Bentley, of Bedford, for improvements in irrigators or machines for watering grass and other lands, roads, floors, flowers, plants, shrubs, and trees, and applicable for all purposes for which ordinary watering pots are employed ; parts of which improvements are also applicable to pumps for raising and forcing liquids.
813. Thomas Wood, of Rumford-street, Manchester, for improvements in centrifugal machines.
814. John Rankin, of Liverpool, for improvements in machinery for cleaning corn and seed.
815. Henry Bollmann Condy, of Battersea, for improvements in concentrating beer, ale, cyder, wine, and vinegar.
816. James Edwards Wilson, of Great George-street, Westminster, for improvements in the construction of iron girders.
817. John Robert Johnson, of Stanbrook-cottage, Hammersmith, for improvements in the manufacture of type and other raised surfaces for printing.
818. John Henry Johnson, of Lincoln's-inn-fields, for an alkaline steam washing apparatus,—being a communication.
819. William Rigby, of Manchester, for certain improvements in machinery or apparatus for engraving metallic cylinders or rollers, employed for printing calico and other surfaces.
820. William Naylor, of Norwich, for improvements in locomotive engines.
821. William Naylor, of Norwich, for improvements in power hammers.
822. William Edward Newton, of the Office for Patents, Chancery-lane, for improvements in producing stereoscopic pictures, and

in the apparatus for exhibiting such or similar pictures,—being a communication.

823. Thomas Whitehead, of Leeds, for improvements in machinery for preparing, combing, drawing, and spinning wool, flax, cotton, silk, and other fibrous substances.

824. John Corlett, of Lumbres, France, for improved machinery for preparing or scutching flax and other fibrous materials requiring such an operation,—being a communication.

825. Alfred Vincent Newton, of the Office for Patents, Chancery-lane, for improvements applicable to the manufacture of weavers' harness,—being a communication.

The above bear date April 7th.

826. Thomas Bromley, of Liverpool, for improvements in the manufacture of soap.

829. William Worby, of Ipswich, for improvements in machinery or apparatus for separating grain from straws, broken off ears, husks, and other refuse, after being thrashed.

830. William Williams, of Park Cottage, Ebbw Vale, and Thomas Evan Williams, of Abersychan Iron Works, near Pontypool, for improvements in reverberatory furnaces.

831. Charles Butler Clough, of Tyddyn Mold, Flintshire, for improvements in the manufacture of coffins.

832. William Crofton Moat, of the Strand, for a machine for crushing, pulverizing, and amalgamating.

833. George Savage, of Stoke-Bruen, Northampton, for improvements in the manufacture of bricks and roofing tiles.

834. Henry Gilbee, of South-street, for improvements in the construction of axle-boxes and axle-bearings,—being a communication.

The above bear date April 8th.

836. William Wood, of Monkhill-house, near Pontefract, for improvements in treating animal matters and refuse.

837. William Wood, of Monkhill House, Pontefract, for improvements in apparatus employed in the manufacture of cut-pile fabrics.

838. Alfred Sohier Bolton and Frances Seddon Bolton, both of Birmingham, for an improvement or improvements in the construction of steam-boilers.

839. Alfred Sohier Bolton and Francis Seddon Bolton, both of Birmingham, for a new or improved method of manufacturing certain kinds of metallic tubes.

840. Felix Lieven Bauwens, of Pimlico, for improvements in distilling fatty bodies, and in stills or apparatus for such distillation.

841. William Lewis Baker, of Hargreave, Northamptonshire, for improvements in clock, tower, turret, and other like bells.

The above bear date April 10th.

842. Richard Archibald Brooman, of Fleet-street, for improvements in the manufacture of hats,—being a communication.
843. Zachariah Round, of Dudley, for an improvement or improvements in bricks to be used in certain parts of buildings.
844. William Elliott Brooks, of Queen-street, Middlesex, for improvements in valves for atmospheric railway tubes.
845. Edward Lavender, of Princes-road, Bermondsey, for improvements in apparatus for stirring and acting on matters subjected to heat in retorts.
847. Charles Anthony Noedl, of Upper Saint Martin's-lane, for a portable vapour bath.
848. John Mitchell, of the Assay Office, Dunning's-alley, London, for improvements in machinery for pulverizing, grinding, amalgamating, and washing ores.
849. John Johnson Peile, of Whitehaven, for an improved construction of lifting jack.
851. Uriah Scott, of Camden Town, for improvements in the adaptation of elastic material to boots and shoes, and shoes for horses and other animals.
852. John Miller the younger, and Michael Burke, both of Liverpool, for improvements in machinery for transmitting motive power.
853. Thomas Carr, of Liverpool, for improvements in steering apparatus.
854. Benjamin Fothergill, and William Weild, both of Manchester, for improvements in machinery for combing cotton, wool, flax, silk and other fibrous materials.
855. William Henry James, of Camberwell, for improvements in marine and other structures.

The above bear date April 11*th.*

856. Lewis Cruger, of Washington, for a new and improved mode of attaching propellers to ships and vessels of all classes,—being a communication.
857. Edward Briggs, of Castleton Mills, near Rochdale, for improvements in machinery and apparatus for finishing yarn and thread.
858. Robert Whiteside, of Egremont, near Birkenhead, for improvements in treating or purifying wheat and other grain.
859. William Coltman, of Leicester, for an improvement in knitting frames.
860. Joseph Piper, of Shoreditch, for improvements in apparatus for affixing adhesive stamps and labels.
861. Samuel Colt, of Spring-gardens, for improved machinery for cutting or shaping metals,—being partly a communication.
862. George Letts, of Northampton, for an improved mole trap.

The above bear date April 12*th.*

863. Samuel Brewster Parker, of Deptford, for an improved apparatus for consuming smoke.

864. Emile William Hansen, of Saxe Gotha, for an electro-magnetic engraving machine.
865. George Elliot, of Saint Helen's, for improvements in the manufacture of carbonate of soda.
866. Arthur Hawker Cox, of Brighton, for improvements in coating pills and bolusses.
867. John Greenwood, of Irwell Springs, near Bacup, and Robert Smith, of Bacup, for certain improvements in sizeing, stiffening, and finishing textile materials or fabrics.
868. Giuseppe Devincenzi, of Grosvenor-street, for a method or methods of producing engraved, figured, and typographic surfaces for printing and embossing from, and for ornaments; also certain machinery employed therein.

The above bear date April 13th.

869. James Griffiths, of Moorgate-street, for an improved portable measuring instrument.
871. Henry Meyer, of Manchester, for improvements in looms for weaving.
872. Joseph Croisy, of Paris, for improvements in machinery for manufacturing bolts, rivets, screw-blanks, railway pins, and other similar articles.
873. Thomas Lawes, of the City-road, for improvements in protectors for the head,—being a communication.
875. Alexander Chaplin, of Glasgow, for improvements in the application of cast-iron to building purposes.
876. Peter Armand le Comte de Fontainemoreau, of South-street, for improvements in priming fire-arms,—being a communication.
877. Frederic Barnett, of Caroline-street, Bedford-square, for illuminated furniture, &c., for interior and exterior decoration.
878. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in the manufacture of steel and wrought-iron directly from the ore,—being a communication.
879. Georges Louis Felix Tiret, of Paris, for an improved canvas for embroidering.

The above bear date April 15th.

880. George Heyes, of Aspull, near Wigan, for improvements in the method of arranging and constructing the gearing or driving apparatus of machinery, to prevent accidents, and save time and expense in arranging the same.
881. Thomas Hawkins, of Northfleet, for an apparatus for creating an upward draught or current of air in chimneys; which apparatus is also applicable to the purposes of ventilation.
882. William Wilkinson, of Nottingham, for improvements in the method of, and machinery for, manufacturing ropes and cords.
883. William Henry Bentley, of Bedford, for improvements in cannons, guns, and other fire-arms, and in projectiles for the same.

884. Benjamin Fullwood, of Bermondsey, for improvements in the manufacture of cement.

885. James Alexander Smith, of Edinburgh, for improvements in the manufacture of explosive projectiles.

886. David Tannahill, of Glasgow, for improvements in lithographic and zincographic printing.

The above bear date April 17th.

887. Charles Chapel Davis, of Bath, for improvements in portable blow-pipe apparatus.

888. Samuel James Healey, of Over Darwen, for improvements in apparatus applicable to steam-boilers for preventing explosions and saving fuel.

889. Charles Meason, of Warrington, for improvements in supplying fuel and water to locomotive engines or to the tenders of locomotive engines.

890. Julian Bernard, of Club Chambers, Regent-street, for improvements in the manufacture of boots and shoes, and in the machinery or apparatus connected therewith.

891. Julian Bernard, of Club-chambers, Regent-street, for improvements in stitching, and machinery and apparatus connected therewith.

893. Charles Watt, of Gloucester Gardens, Kentish Town, for improvements in bleaching hemp, flax, and other fibrous substances.

894. Henry Hucks Gibbs, of Bishopsgate-street, for improvements in the manufacture of nitrate of soda,—being a communication.

895. John Frearson, of Smethwick, for improvements in steam-engines.

896. William Denton, of Addingham, Yorkshire, for improvements in combing wool and other fibres.

897. Jean François Felix Challeton, of Brughat, France, for certain machinery for purifying and condensing peat, and also for conveying it.

The above bear date April 18th.

898. Jean Daniel Pfeiffer, of Paris, for improvements in book-binding.

899. Moses Poole, of the Avenue-road, for improvements in drying and weighing fibrous and other substances,—being a communication.

900. John Kirkham, of Tonbridge-place, for improved means of consuming smoke in furnaces.

901. John Coope Haddan, of Chelsea, for improvements in adhesive stamps and labels.

902. John Jeyes, of Northampton, for improvements in the manufacture of pulp suitable for paper-making.

903. Jeremiah Briggs, of Derby, for a means of communicating intelligence from one part of a railway train to another, and from one place to another.

904. Henry Clarke, of Lincoln, for improvements in cannons, guns, and other fire-arms.
905. Richard Archibald Brooman, of Fleet-street, for improvements in separating substances of different specific gravities, and in machinery employed therein,—being a communication.

The above bear date April 19*th.*

906. Thomas Vickers, of Manchester, for improvements in the manufacture of manure.
907. Edmund Hunt, of Walcot-square, Kennington-road, for improvements in treating minerals for the extraction of their valuable metals.
908. Robert Richardson, of Great George-street, for an improved method of joining or securing the joints of pipes.
909. John Pym, of Bangor, for improvements in the manufacture of pipes for the transmission of water and other fluids.
910. Henry Brown, of Halifax, Yorkshire, for improvements in combing wool, hair, cotton, and other fibrous materials.
911. John Montgomery Reed, of Northumberland-street, Strand, for improvements in the treatment of amalgams.
912. George Jones, of Spring Vale Iron Works, Sedgley, for improvements in landing apparatus, to be used in working mines.
913. William Johnson, of Lincoln's-inn-fields, for improvements in machinery or apparatus for making bricks or tiles,—being a communication.
914. William Johnson, of Lincoln's-inn-fields, for an improved apparatus for discovering the leakage or escape of gas,—being a communication.

The above bear date April 20*th.*

915. Thomas Wood and Samuel Howard Heginbottom, both of Culcheth, for improvements in metallic pistons for steam-engines and pumps.
916. Frederick Buonaparte Anderson, of Gravesend, for an improvement in spectacles and eye-glasses.
917. Richard Jex Crickmer and Frederick William Crickmer, of Bermondsey, for improvements in cannons and field-pieces.
918. Charles Cammell, of Cyclops Steel Works, Sheffield, for improvements in the permanent way of railways.
919. Robert Hanham Collyer, of Norfolk-street, Strand, for improved machinery for crushing or triturating hard substances.
920. William Harcourt and Joseph Harcourt, both of Birmingham, for improvements in chamber or flat-bottomed candlesticks.
921. Samuel Minshull and Charles Austin, both of Birmingham, for improvements in securing and fastening the lids of boxes or cases, used for packing manufactured or other goods.
922. William Britton Stephens, of Mark-lane, for improvements in lamps,—being a communication.

923. Aimé Blavier, of Boulevard Mont Parnasse, Paris, for improvements in locomotive engines.

The above bear date April 21st.

924. Henry Bernoulli Barlow, of Manchester, for improvements in manufacturing metal nuts, and in machinery for stamping, forging, and punching the same,—being a communication.
925. Pierre Jean Felix Mouchell, of Paris, for certain improvements in melting and in treating the ores and metals.
926. John Harlow, of Moseley, for improvements in the manufacture of paper, pasteboard, and millboard.
927. Thomas Freman Finch, of Worcester, for improvements in the manufacture of buttons.
928. Joseph Gill, of Marsala, Sicily, for improvements in apparatus for the distillation of spirituous liquors.
929. Robert Galloway, of Lambeth, for improvements in the construction of furnaces.
930. William Goodchap, of Walbrook House, London, for im-improvements in obtaining power by carbonic acid gas,—being a communication.
931. James Warren, of Old Broad-street, for improvements in the construction of railways.

The above bear date April 22nd.

932. Charles Emilius Blank, of Trump-street, for improvements in winding or reeling yarn into hanks,—being a communication.
933. David Buddo, of St. Andrew's, Fifeshire, for a magnetic weather-gauge to give warning of the approach of gales and storms, &c.
934. Charles Hart, of Wantage, for an improvement in the mode of applying power to combined threshing and dressing machines.
935. Moses Poole, of the Avenue-road, for improvements in washing garments and fabrics,—being a communication.
936. John Wilson, of Croydon, for improvements in the construction of portable houses and other buildings.
937. William Edward Newton, of the Office for Patents, Chancery-lane, for improved machinery for casting type,—being a communication.
938. James Combe, of Belfast, for improvements in machinery for hackling flax and other fibrous substances.
939. William Edward Newton, of the Office for Patents, Chancery-lane, for the application of a new or improved material or substance to the construction of certain parts of machinery,—being a communication.
940. Thomas Weatherburn Dodds, of Rotherham, for improvements in furnaces and fire-places for effecting a more perfect combustion of fuel and prevention of smoke.
941. Jonathan Davidson, of Edinburgh, for improvements in breakwaters.

942. William Blackwood, of Arthurlie, Renfrew, for improvements in the treatment and finishing of threads or yarns.

The above bear date April 24th.

943. Richard Ford Sturges, of Birmingham, for an improvement or improvements in joining metals.
944. Frederich Ludewig Hahn Danchell, of Acton, for improvements in obtaining and applying motive power.
945. Felix Alexandre Testud de Beauregard, of Paris, for certain improvements in the manufacture of inks, and in the preparation of papers for receiving the same.
946. William Collier, of Weston, Cheshire, for improvements in evaporating pans for concentrating solutions of certain acids, alkalies, and salts.
947. Richard Ellis and James William Martin, both of St. James's, for improvements in the mode of drying or desiccating by the agency of atmospheric air.
948. John Aitken, of Douglas, N.B., for improvements in sawing machinery.
949. John Lawson and Somerville Dear, both of Leeds, for improvements in looms for weaving.
950. John Goucher, of Worksop, Nottinghamshire, for improvements in propelling ships and other vessels.

The above bear date April 25th.

951. Charles Cléophas Person, of Paris, for certain improvements in coating with zinc by galvanization.
952. Edward Crosland, of Rochdale, and Thomas Boardman, of Westhoughton, for improvements in weaving, and in machinery for manufacturing cut-pile and other fabrics.
953. Thomas Griffith Owen, of Shrubland-road, Dalston, for an improved construction of portable filter.
954. William Gravatt, of Park-street, Westminster, for an improvement in propelling ships and other vessels.
955. John Henry Johnson, of Lincoln's inn-fields, for improvements in revolving fire-arms,—being a communication.
956. John Henry Johnson, of Lincoln's-inn-fields, for improvements in polishing and flattening metal plates,—being a communication.
957. Sir George Richard Farmer, of Bideford, for improvements in safety-valves for steam-boilers.
958. Henry Clarke, of Lincoln, for improvements in fire-arms and ordnance.
959. Richard Green, of Sydney-street, Brompton, for improvements in propelling vessels.
960. Joseph Barling, of Maidstone, for improvements in treating the hop bine, and rendering it applicable to the manufacture of paper and other articles.
961. Frederick Woodbridge, of Green's-terrace, Rotherhithe, for improvements in furnaces.

The above bear date April 27th.

962. Andrew White Gibson, of Edinburgh, for improvements in mills for the manufacture of barley and rice.

963. William Littell Tizard, of Aldgate, for certain apparatus for roasting and calcining ores and minerals and separating metals therefrom; which apparatus is in whole or in part applicable to the drying and roasting of malt and other vegetable substances.

964. John Evans, of Abbots Langley, for a new manufacture of paper.

965. James Heywood, of Ratcliff Bridge, Lancashire, for certain improvements in machinery or apparatus for printing yarns.

The above bear date April 28th.

966. Alexander Mills Dix, of Salford, for improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.

967. Benjamin Dixon, of Birmingham, for an improvement or improvements in the joints of measuring rules.

968. Jean Philippe Varlet, of Paris, for improvements in obstructing the holes produced by accidents or projectiles in the hulls of ships and boats.

The above bear date April 29th.

970. Joseph Porter, of Salford, and Richard Howson, of Manchester, for improvements in forge hammers.

971. Edward Briggs, of Castleton Mills, near Rochdale, and William Souter, of the same place, for improvements in treating and preparing silk, and in machinery connected therewith.

974. Walter Macfarlane, of Glasgow, for improvements in water-closets, lavatories, dust-bins, and public and domestic conveniences.

975. James Fenton, of Low Moor, Bradford, for improvements in safety-valves.

976. James Hamilton, of New York, for improvements in machinery for crushing quartz and other substances.

977. William Russell Palmer, of New York, for improvements in the construction of spike threshing machines, whereby all liability to, and danger of, accident in their use, is removed and prevented, and by which the grain is cleaned from chaff, smut, &c., at the same time it is being threshed.

978. John Clarke, of Leicester, for improvements in knitting machinery.

The above bear date May 1st.

981. Jos Mayer, of Burslem, and John David Kind, of Birmingham, for an improvement or improvements in attaching door-plates, letters and figures made of glass, porcelain, earthenware, or other vitreous or semi-vitreous substance to doors and such other surfaces as the same may be required to be attached to.

982. Alfred Trueman, of Swansea, for improvements in the manufacture of sulphuric acid, when roasting copper ores, and also when burning sulphur or iron pyrites.

983. Richard Waller, of Leeds, for improvements in valves applicable to steam-engines and other purposes, and in apparatus connected with the same.

984. William Edward Newton, of the Office for Patents, Chancery-lane, for improvements in moulding, preparing, and finishing articles and fabrics made of compounds of caoutchouc, gutta-percha, and other substances,—being a communication.

985. Carlo Minasi, of Brecknock-place, Camden-town, for improvements in apparatus for hatching eggs, and for raising or rearing the young when first produced.

987. Guillaume Dié, of Paris, for certain improvements in the manufacture of tracing cloths and tracing paper.

988. Désiré Plisson, of Paris, for certain improvements in chemical condensing apparatus.

989. Leon Glukman, of Sackville-street, Dublin, for improvements in effecting electric communications in railway trains and vessels.

990. Benjamin Bishop and Joseph Dyer, of Birmingham, for improvements in the manufacture of stop-butts and other hinges.

The above bear date May 2nd.

991. Thomas Main, of Glasgow, for improvements in steam-engines.

992. John Henry Johnson, of Lincoln's-inn-fields, for improvements in lathes for turning wood and other materials,—being a communication.

993. William Westley Richards, of Birmingham, for an improvement or improvements in loading certain kinds of fire-arms.

994. Auguste Edouard Loradoux Bellford, of Castle-street, for certain improvements in grinding-mills,—being a communication.

995. Eugène Hippolyte Rascol, of Catherine-street, Strand, for an improved connection for driving straps, bands, or belts,—being a communication.

996. Moses Poole, of the Avenue-road, Regent's-park, for improvements in paving or covering the surfaces of roads, streets, or ways,—being a communication.

997. William Hyde Knapp, of Cross-street, Islington, for improvements in the manufacture of hats and bonnets.

The above bear date May 3rd.

999. Edward Barlow, of Bolton-le-Moors, William Johnson, of Farnworth, and William Slater and Peter Knowles, both of Bolton-le-Moors, for improvements in machinery for preparing and spinning cotton and other fibrous materials.

1001. James Nasmyth, of Patricroft, near Manchester, for an improvement in the process of puddling iron.

The above bear date May 4th.

1003. Henry Stewart, of Baker-street, Bedford-square, for a pocket protector and pocket.
1005. Frank Clarke Hills, of Deptford, for improvements in the means of preventing or consuming smoke in furnaces.
1007. Adrien Georges Amant Martin, and Casimir Lefol, both of Paris, for certain improvements in the manufacture of iron wheels.
1009. Joseph Wonfor, of The London Manure Company, Bridge-street, Blackfriars, for improvements in the manufacture of manure.
1011. Vincent Wanostrocht, of Great Tower-street, for improvements in the construction of cannon, and in projectiles to be used therewith,—being a communication.

The above bear date May 5th.

1012. Thomas William Gibson, of Thomas-street, Blackfriars-road, for making a new beverage intended to be called "Gibson's pinerium, or aërated sarsaparilla."
1013. Edward John Montagu Archdeacon, of Walworth, for an improved book-mark, or index.
1014. Bernard Joachim La Mothe, of New York, for improvements in the construction of buildings.
1015. Josiah George Jennings, of Great Charlotte-street, Blackfriars, for improvements in the manufacture of earthenware pipes for drains and sewers.
1016. Bernard Joachim La Mothe, of New York, for improvements in the construction of rail-road cars.
1017. Josiah George Jennings, of Great Charlotte-street, Blackfriars, for improvements in apparatus for regulating and supplying water for water-closets and other purposes.
1018. Henry Gregory Drewe, of Paddington, for improvements in obtaining metal from ores.
1019. Richard Waller, of Leeds, for improvements in engines and apparatus, and means of obtaining motive power from liquids, vapours, gases, or air; parts of which invention may be applied also to ordinary steam or other engines.
1021. Charles Cammell, of Cyclops Steel Works, Sheffield, for improvements in buffer, draw, and bearing springs, for railway carriages, and in the mode of, or apparatus for, making the same.
1023. John Hartley Higginbottom, of Ashby-de-la-Zouch, for improvements in the valves and apparatus connected with water-closets; certain portions of which are applicable as cocks or valves for other purposes.

The above bear date May 6th.

New Patents.

Sealed under Patent Law Amendment Act, 1853.

2399. George Louis Stocks.
2401. Alphonse D. Noel.
2403. Cornelius Nicholson.
2410. Willam Roy, sen.
2431. C. Cross and J. Crosby.
2434. C. N. Michel and A. Lecomte.
2435. J. F. F. Challeton.
2441. Harry Bentley.
2448. Henry Kraut.
2451. Charles Brewster.
2452. E. J. M. Archdeacon.
2459. J. D. Brady.
2464. David Bogue.
2465. William Bottomley.
2468. Marcus Davis.
2481. J. T. G. Vizetelly.
2482. A. F. Rémond.
2487. W. Vaughan, J. Scattergood, and C. Grimshaw.
2490. W. Mc Naughton.
2493. Joseph Gurney.
2495. M. Maclaren.
2498. J. W. Wilkins.
2503. R. A. Brooman.
2507. J. T. Wright, E. P. Wright, and W. Asbury.
2509. E. G. Banner.
2511. F. P. Rovère.
2516. John Brown.
2517. D. Assanti.
2522. S. Lomas.
2524. Mark Newton.
2525. Arthur Elliott.
2536. E. D. Smith.
2541. Frederick Lipscombe.
2543. H. Brierley.
2547. Peter Mc Gregor.
2554. Peter Hindle.
2555. G. Duncan, J. Boyd, and J. Barker.
2556. Ebenezer Goddard.
2558. James Scott.
2559. George Nasmyth.
2562. Wm Crosland.
2566. Henry Pratt.
2569. John Smith.
2571. S. Harrison.
2572. John Hyde.
2573. C. Carr and W. K. Horsley.
2574. R. W. Jearrad.
2576. J. Barlow and T. Settle.
2577. W. B. Johnson.
2581. W. L. J. C. V. Falconi.
2583. J. Grindrod and A. Hunter.
2584. H. Wiglesworth.
2585. R. Roughton.
2586. Thomas Walker.
2594. J H. Johnson.
2595. George Shepherd.
2598. J. A. Drieu.
2610. E. G. Banner.
2614. William Steel.
2619. J. H. Dickson.
2623. F. A. Delande.
2627. William Austin.
2629. William Austin.
2634. Henry Willis.
2641. C. De Bergue.
2642. J. J. Catterson.
2655. J. H. Johnson.
2656. David Pratt.
2657. John Ferguson.
2660. J. Bristow and H. Attwood.
2661. George Carter.
2663. G. Dugmore and G. H. Millward.
2664. S. Abraham & S. V. Abraham.
2665. Wm. Ashton.
2666. John Banfield.
2669. Thomas Bourne.
2670. A. J Hoffstaedt.
2676. Thomas Holmes.
2681. J. B. Clavières.
2684. J H. Brown.
2688. James Harris.
2689. A. Castets.
2691. Wm. Austin.
2693. T. J. Dimsdale.
2695. Emanuel Wharton.
2698. W. H. Tucker & W. R. Reeves.
2703. R. J. Sibbald.
2704. A. Radcliffe.
2706. W. Joyce and T. Meacham.
2707. Edward Briggs.
2712. R. Adams.
2716. C. Ramsay.
2729. J. D. Brady.
2731. James Lovell.
2741. A. A. V. S. de Montferrier.
2754. E. Barthélemy, T. Petitjean, and J. P. Bourquin.
2764. J. S. Rousselot.
2767. J. Walmsley.
2768. P. C. J. B. Sochet.
2776. E. J. Hughes.
2796. J. Dilworth.

2798. J. H. Johnson.
2802. A. E. L. Bellford.
2817. J. and J. E. A. Gwynne.
2836. J. H. Johnson.
2837. J. Bernard.
2882. E. Green.
2891. W. F. Plummer.
2899. J. L. Kay.
2909. J. P. H. Vivien.
2910. A. E. L. Bellford.
2923. A. Médail.
2942. J. Greenwood.
2946. R. Whewell.
2951. A. E L. Bellford.
2955. J. H. Campbell.
[redacted]. James Gibbons, jun.
2992. G. A. Buchholz.
3010. Francis Parker.
3026. H. C. C. De Ruolz and A. De Fontenay.

1854.

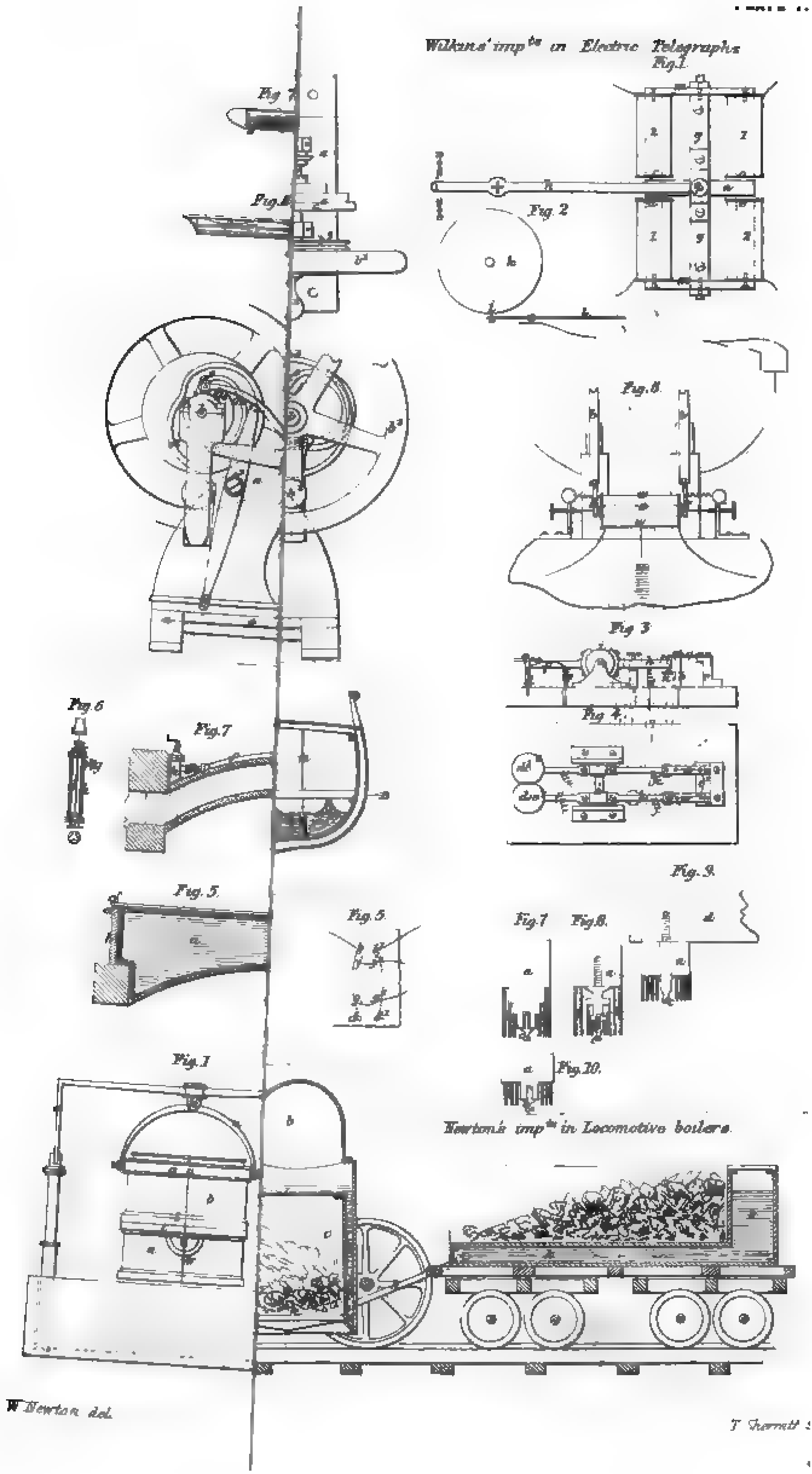
17. J. Bernard.
28. A. V. Newton.
33. J. Healey.
41. J. H. Johnson.
55. W. R. Bowditch.
62. A. A. Masson.
78. J. F. Boake.
79. J. W. Partridge.
102. G. F. Wilson.
109. Henry Holland.
157. C. C. Armstrong & W. Pursall.
180. W. Massey.
183. J. Bird.
196. C. Reeves and W. Wells.
228. J. H. Johnson.
232. E. W. K. Turner.
233. Thomas Hollingsworth.
234. L. Young and E. Marten.
236. J. Hazlehurst.
257. J. Hargreaves and J. Fletcher.
262. H. Watson.
274. E. Howard and D. P. Davis.
279. James Boydell.
281. R. S. Newall.
303. A. V Newton.
312. P. A. Le Comte de Fontainemoreau.
317. F. M. Lyte.
319. John Taggart.
326. James Young.
328. H. Warner, J. Haywood, and W. Cross.
351. J. B. Smith and E. Smith.
353. T. Bury, W. Glover, J. W. Speed, and J. Hardman.
356. C. A. Holm.
357. Thomas Irving.
359. Arthur Jonson.
365. B. H. Hine, A. J. Mundella, and W. Onion.
369. G. F. Wilson.
375. J. D. M. Stirling.
377. G. F. Wilson.
385. Joseph Hinchliffe.
388. Moses Poole.
401. John Chisholm.
402. James Beall.
403. H. Hilliard.
405. William Milner.
407. John Urie.
409. Frederick Osbourn.
414. Robert Walker.
415. James Boydell.
416. Ernst Gessner.
422. W. Gossage.
423. W. C. T. Schaeffer.
429. Samuel Colt.
430. J. de Wolfe Spurr.
441. Peter Fairbairn.
442. W. Ryder and J. Ryder.
444. S. L. Hardy.
452. E. H. Bentall.
464. C. Lamport.
465. James Boydell.
466. John Elder.
472. J. D. M. Stirling.
473. Charles De Bussy.
483. William Simpson.
485. A. L. Mallet.
487. James Medwin.
489. J. T. Way & J. M. Payne.
496. C. Hargrove.
502. W. and J. Cliffran.
506. Thomas Metcalfe.
511. A. Barclay.
522. Caleb Bloomer.
523. J. Bour.
529. F. Abate.
530. H. D. Mertens.
534. John Warhurst.
544. William Clay.
548. H. B. Barlow.
563. G. T. Selby.
571. S. Trotman.
585. G. & C. Appolt.
590. W. T. Monzani.
595. J. H. Johnson.
621. J. Houston, jun.
634. J. G. Marshall and P. Fairbairn.
637. R. W. Harris & T. Patstone.
696. Wm. Wood.
700. W. Neilson.

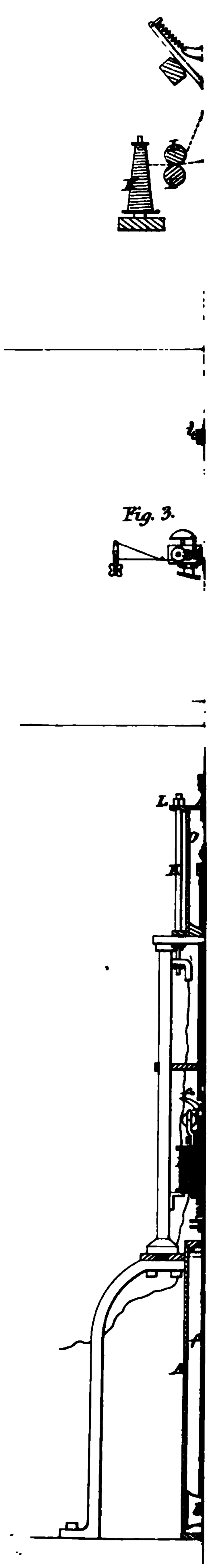
*** *For the full titles of these Patents, the reader is referred to the corresponding numbers in the List of Grants of Provisional Protections.*

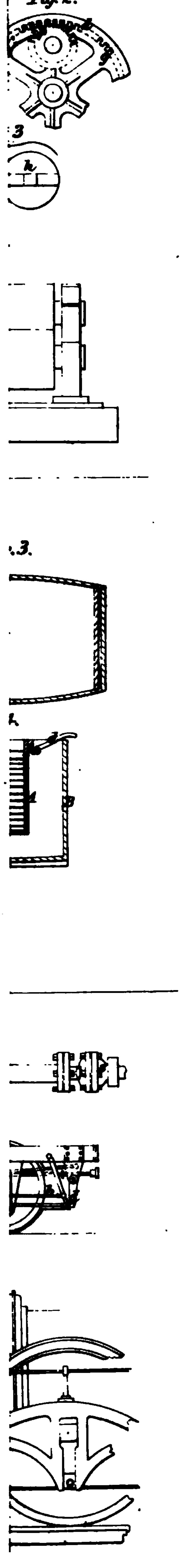
CELESTIAL PHENOMENA FOR JUNE, 1854.

D.	H.	M.	
1			Clock after the ☉ 2m. 32s.
	—		☽ rises 8h. 18m. M.
	—		☽ passes mer. 4h. 35m. A.
	—		☽ sets 0h. 12m. M.
	14	6	♀ in Aphelion.
			Occul. 42, Leonis, im. 11h. 5m. em. 12h. 1m.
2	8	52	♂ in □ with the ☉
3	8	3	♂ in conj. with the ☽ diff. of dec. 4. 29. S.
4	0	40	☽ in □ or first quarter
5			Clock after the ☉ 1m. 53s.
	—		☽ rises 1h. 9m. A.
	—		☽ passes mer. 7h. 33m. A.
	—		☽ sets 1h. 29m. M.
	9	30	☽ in □ or first quarter.
7	3	41	♃'s first sat. will im.
	11	6	♃'s second sat. will im.
8			Occul. 28 Libræ, im. 12h. 34m. em. 12h. 47m.
9	3	17	☿ greatest hel. lat. N.
10			Clock after the ☉ 0m. 58s.
	—		☽ rises 8h. 13m. M.
	—		☽ passes mer. 12h. 0m. A.
	—		☽ sets 3h. 2m. M.
	11	30	Ecliptic oppo. or ○ full moon
11	5	0	☽ in Perigee
	20	23	♃ in conj. with the ☽ diff. of dec. 4. 2. N
13			Occul. B.A.C. 7237, im. 15h. 18m. em. 15h. 30m.
14	2	15	♃'s fourth sat. will im.
15			Clock before the ☉ 0m. 3s.
	—		☽ rises 11h. 55m. A.
	—		☽ passes mer. 3h. 15m. M.
	—		☽ sets 7h. 15m. M.
16			Ceres stationary.
	0	4	♃'s first sat. will im.
17			Mercury, R. A., 7h. 10m. dec. 24. 25. N.
	—		Venus, R. A., 2h. 47m. dec. 13. 38. N.
	—		Mars, R. A., 11h. 19m. dec. 5. 10. N.
	—		Vesta, R. A., 11h. 2m. dec. 13. 45. N.
17			Juno, R. A., 11h. 26m. dec. 8. 3. N.
	—		Pallas, R. A., 19h. 39m. dec. 20. 47. N.
	—		Ceres, R. A., 21h. 32m. dec. 24. 56. S.
	—		Jupiter, R. A., 19h. 52m. dec. 21. 17. S.
	—		Saturn, R. A., 4h. 26m. dec. 20. 3. N.
	—		Uranus, R. A., 2h. 50m. dec. 16. 0. N.
	—		Mercury passes mer. 1h. 29m.
	—		Venus passes mer. 21h. 6m.
	—		Mars passes mer. 5h. 37m.
	—		Jupiter passes mer. 14h. 7m.
	—		Saturn passes mer. 22h. 41m.
	—		Uranus passes mer. 21h. 5m.
	2	14	☽ in □ or last quarter.
	17	17	♀ in conj. with ♅ diff. of dec. 2. 8. S.
18			Occul. 33, Ceti, im 12h. 24m. em. 13h. 19m.
20			Clock before the ☉ 1m. 7s.
	—		☽ rises 1h. 17m. M.
	—		☽ passes mer. 8h. 8m. M.
	—		☽ sets 2h. 14m. A.
	22	25	♅ in conj. with the ☽ diff. of dec. 1. 9. N.
21	6	4	☿ in conj. with the ☽ diff. of dec. 1. 18. S.
	7	8	☉ enters Cancer: summer com.
22	22	39	♄ in conj. with the ☽ diff. of dec. 2. 23. S.
24	4	48	Juno in conj. with ♂ diff. of dec. 3. 56. N.
	10	43	♀ greatest hel. lat. S.
25			Clock before the ☉ 2m. 12s.
	—		☽ rises 3h. 17m. M.
	—		☽ passes mer. 0h. 3m. A.
	—		☽ sets 8h. 15m. A.
	0	2	Ecliptic conj. or ● new moon.
	20		☽ in Apogee
27	5	58	☿ in conj. with the ☽ diff. of dec. 3. 37. S.
30	22	55	☉ in Apogee.

J. LEWTHWAITE, Rotherhithe.

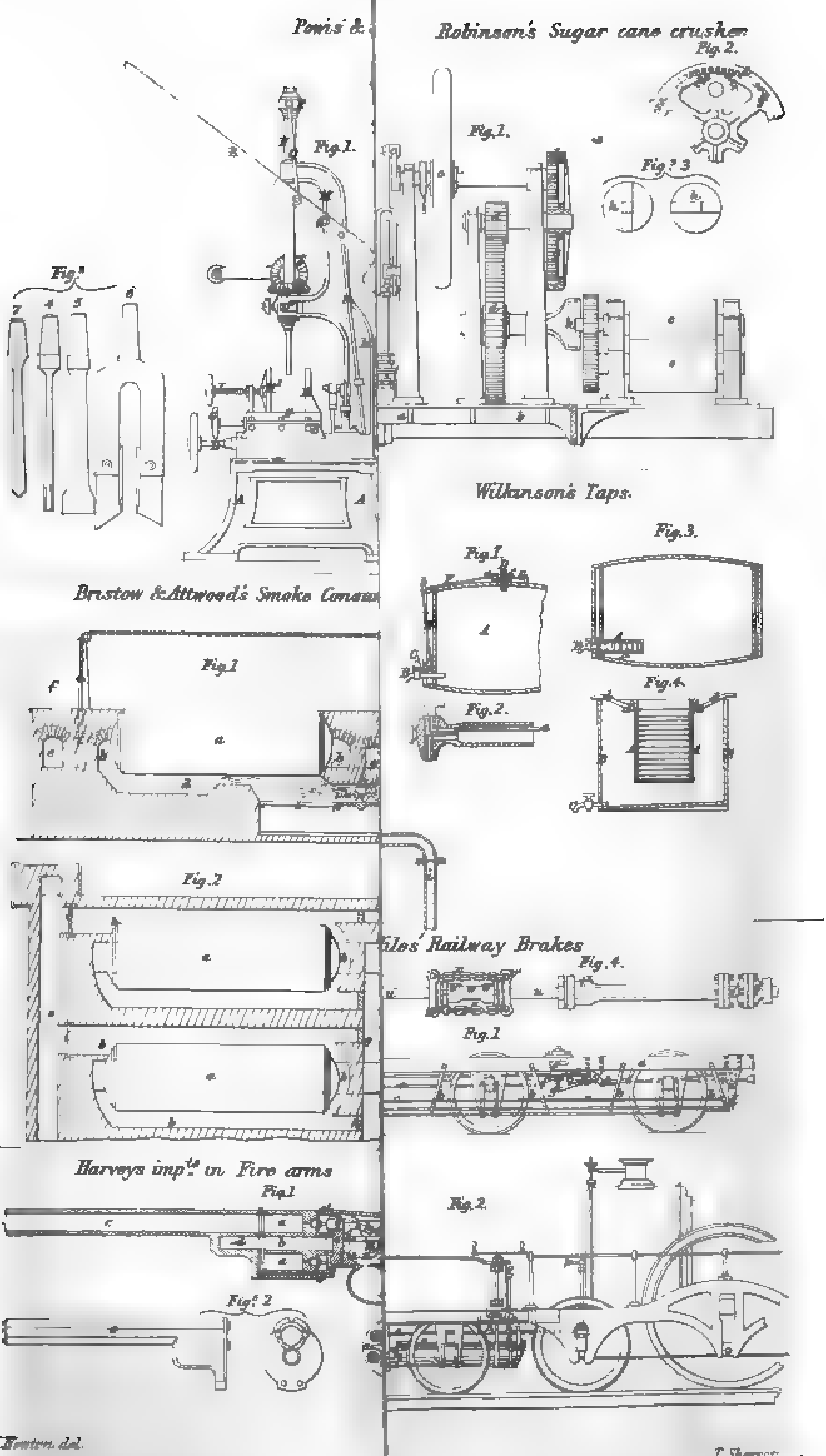

Wilkins' impts in Electric Telegraphs
Fig. 1.
Fig. 2
Fig. 8.
Fig. 3
Fig. 4.
Fig. 7
Fig. 8
Fig. 6
Fig. 7
Fig. 5.
Fig. 5.
Fig. 9.
Fig. 7
Fig. 8.
Fig. 10.
Fig. 1
Newton's impts in Locomotive boilers.
W Newton del.
T. Jerrett sc.





W. Newton, del.

T. Sherratt Sc



W. Newton del.

T. Sherratt

Bayliss

Fig. 2.

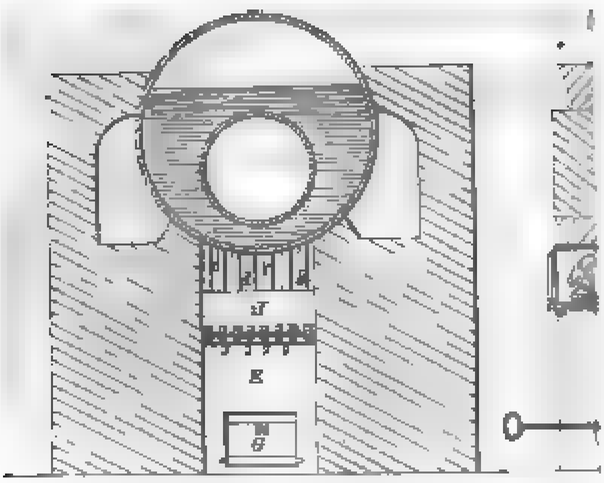


Fig. 5.

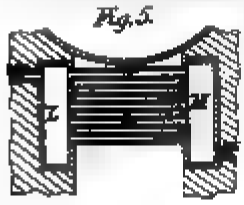


Fig. 4.

Fig. 3.

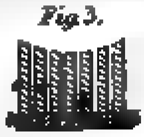


Fig. 6.

Johs

Fig. 1.

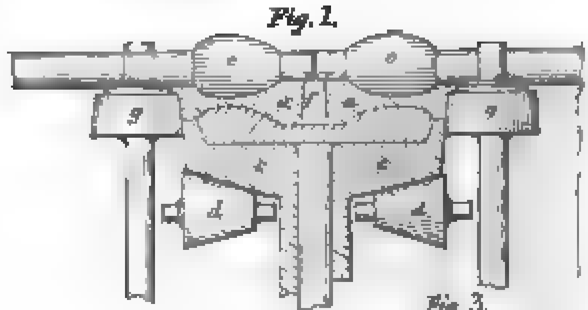
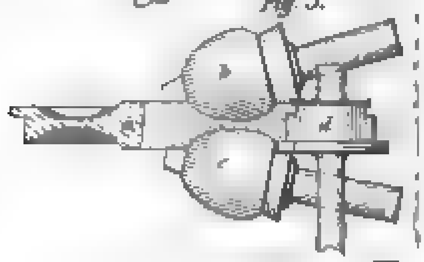


Fig. 3.



Wyburn's Easy Chair

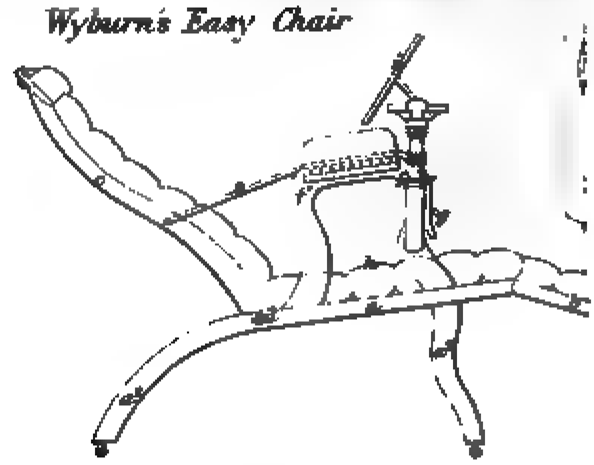


Fig. 1.

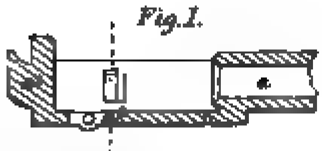
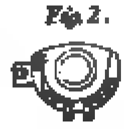


Fig. 2.



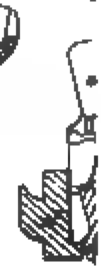
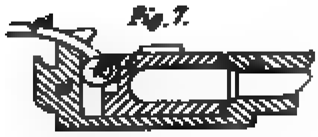


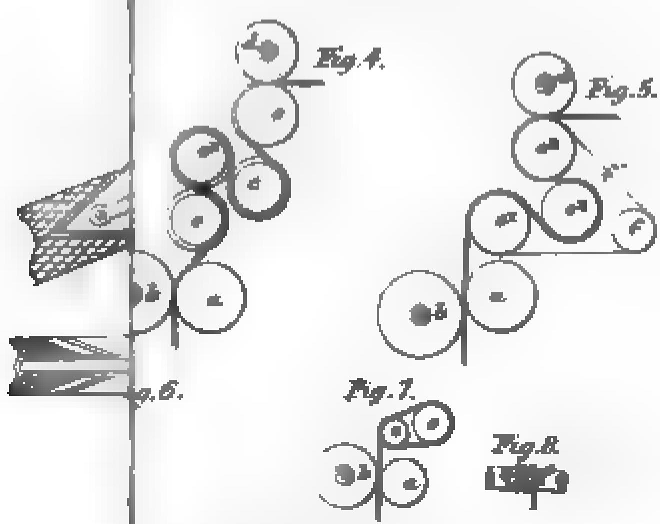
Fig. 3.

Fig. 7.

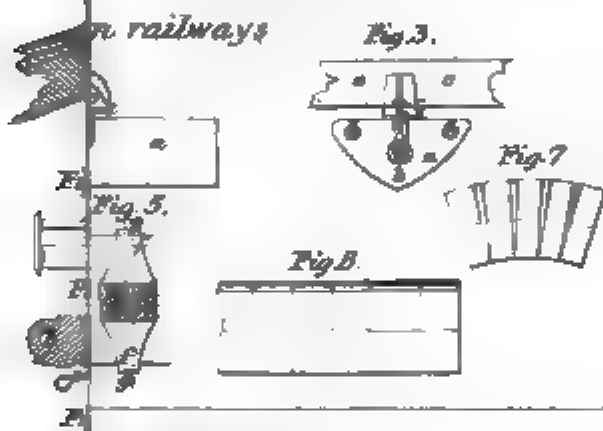


W. Newton del.

...airn & Kaselowsky spinning mach.s

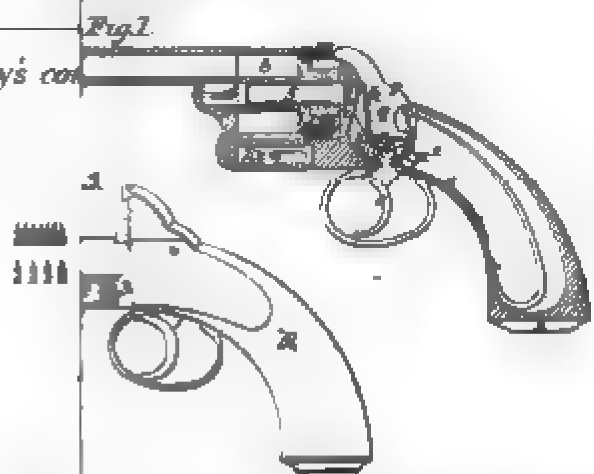


...n railways

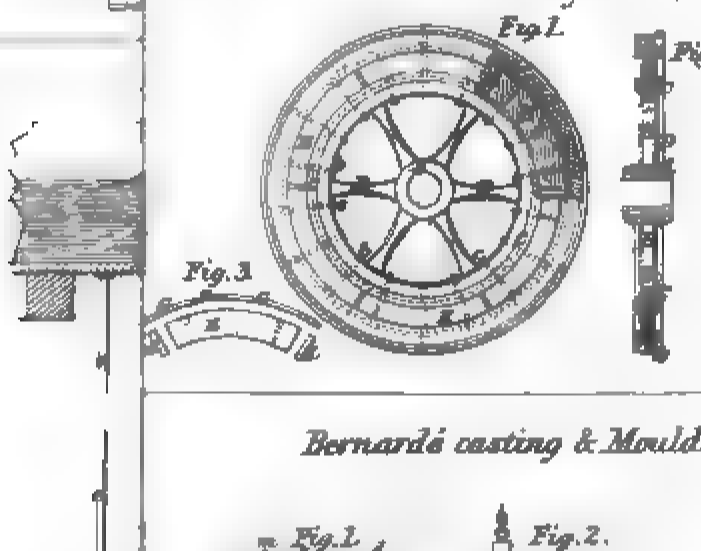


Imp.ts in fire-arms

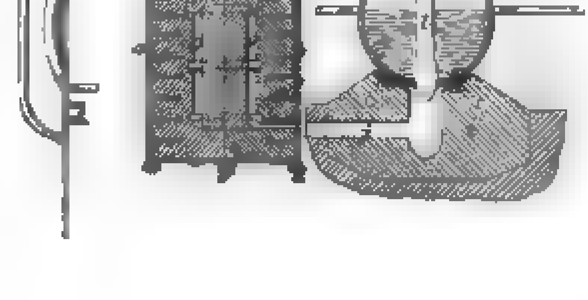
Mowbray's co...



Blake's railway wheels.

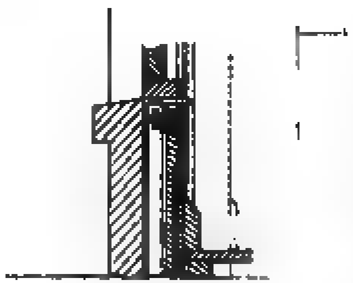


Bernard's casting & Moulding



W. Newton del. T. Sharratt Sc.

Pritchett's shutters



Wright's imp^{ts}. in crushing gold

Fig 2

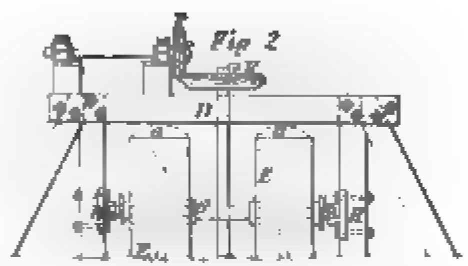
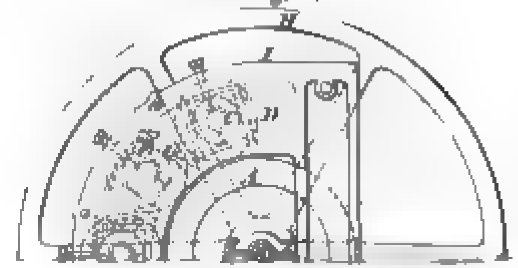


Fig. 1.



Bellford's imp^{ts}. in gold crushing machines

Fig. 1

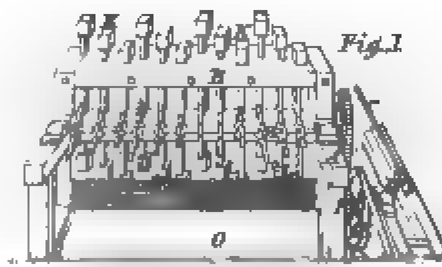
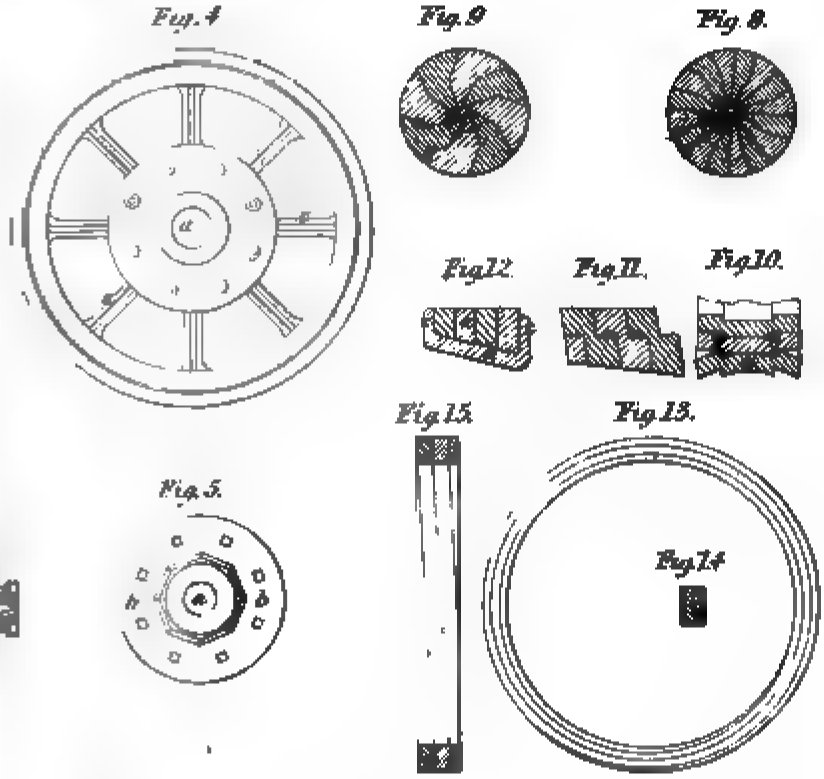
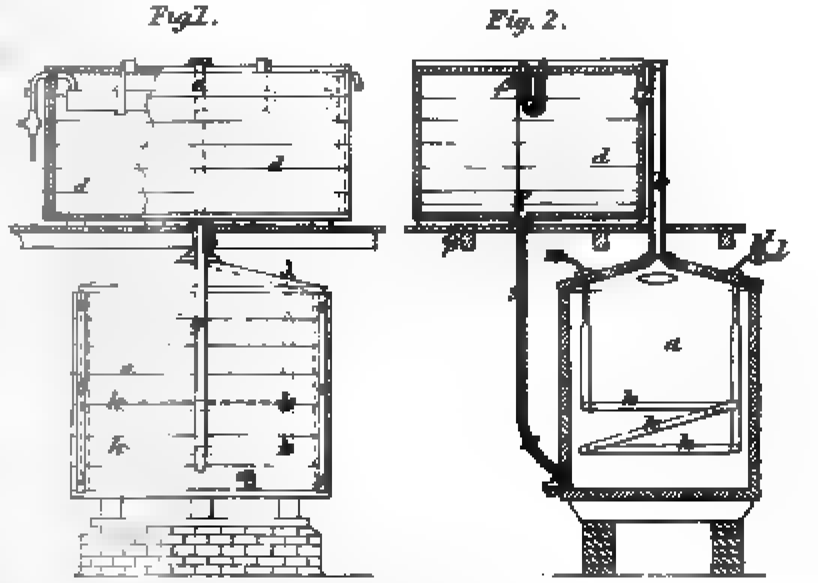


Fig 2.

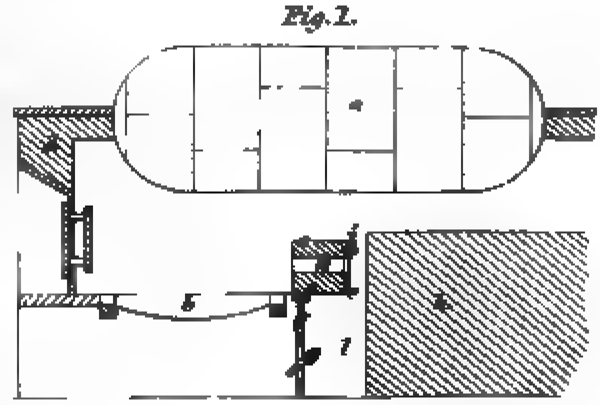
Dodds' impts in wheels

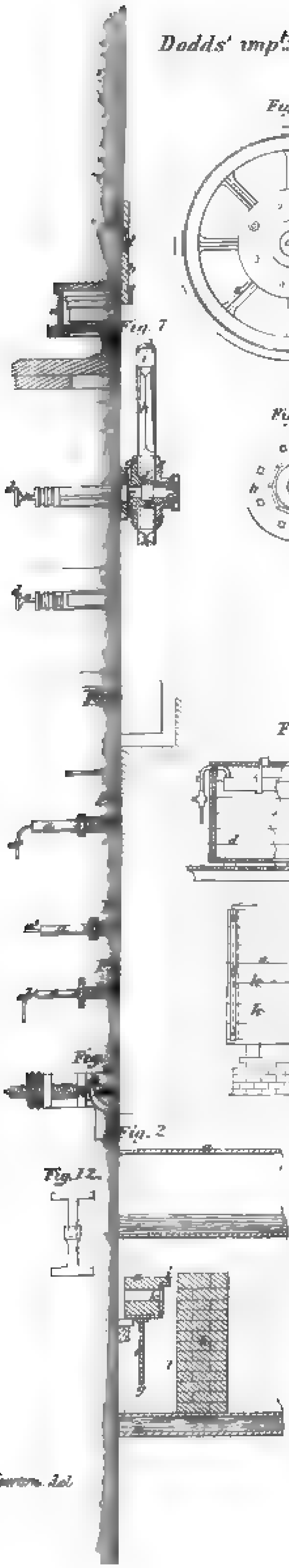


Walker's brewing appts



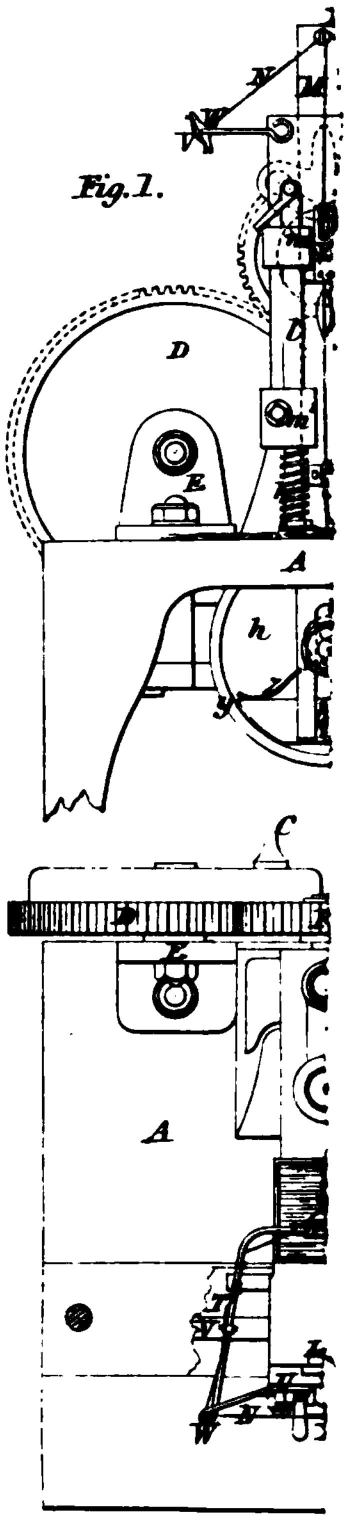
Gray's consuming smoke.





W. Newton. del. T. Sherratt Sc

Fig. 1.



Newton's se

Fig. 1.

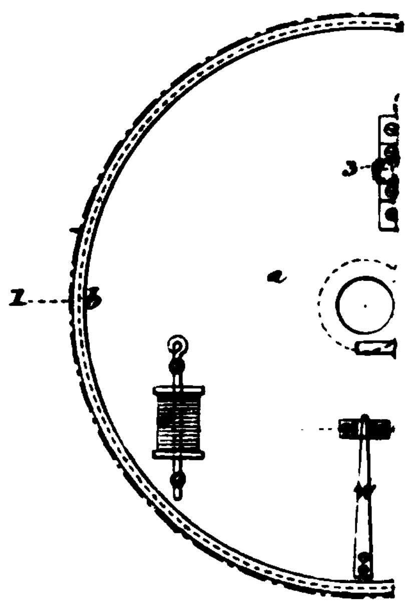


Fig. 2.

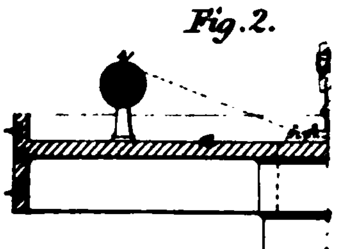
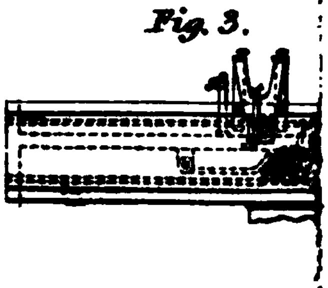


Fig. 3.



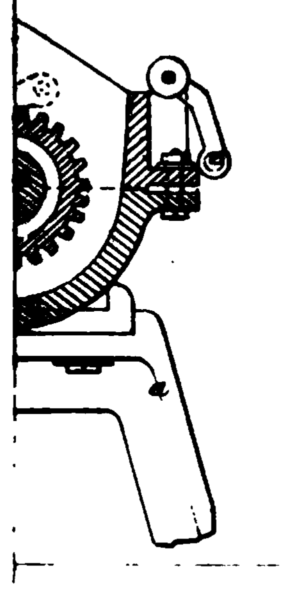
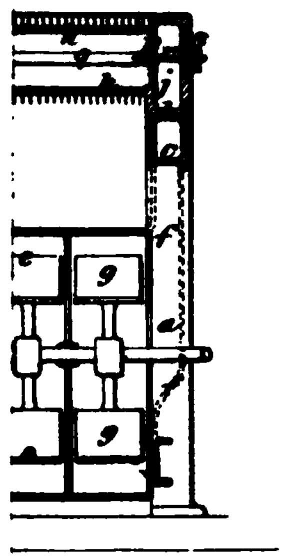


Fig. 2.



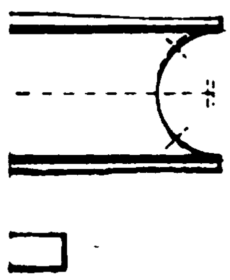


Fig. 5.

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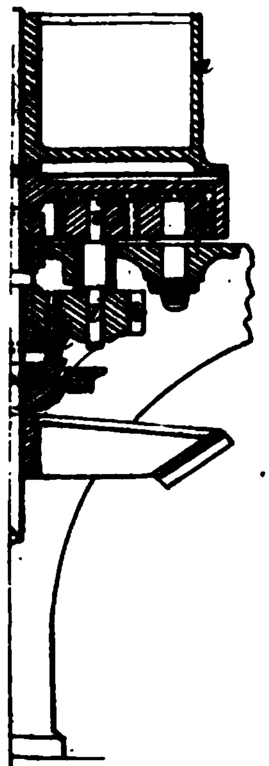
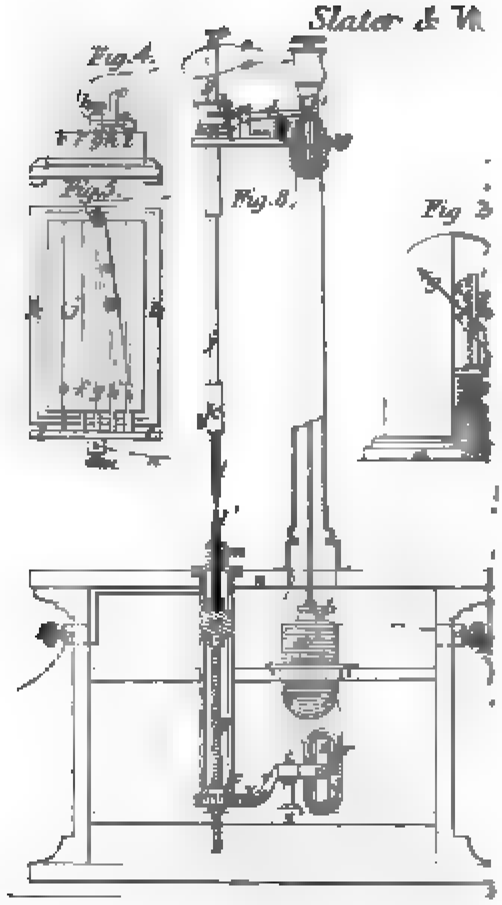


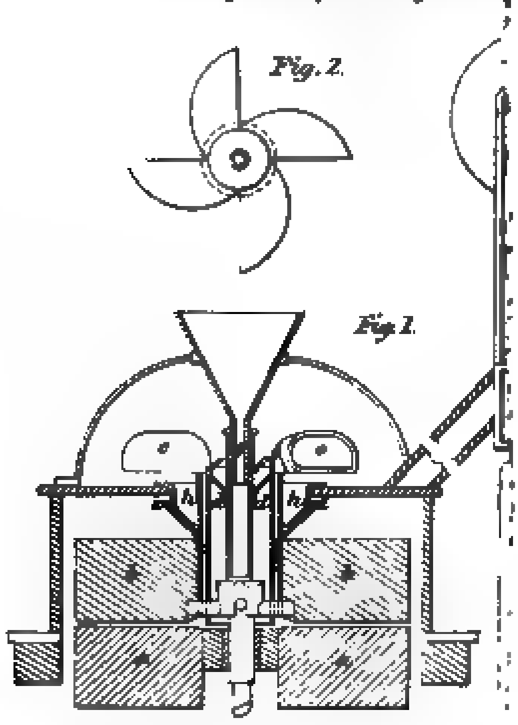
W. Newton del.

T. Sherratt Sc.

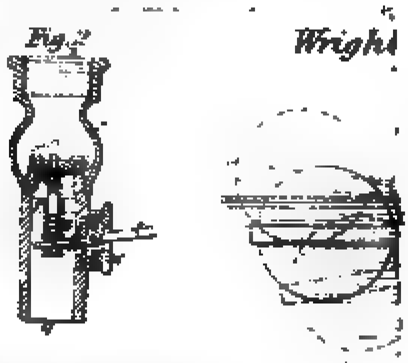
Slater & W



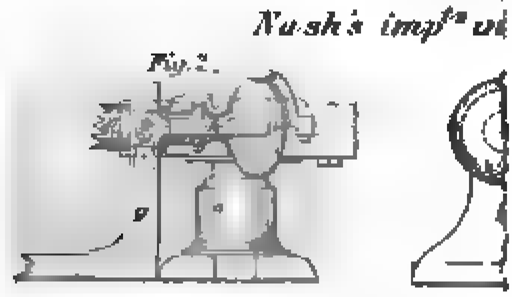
Young's imp^{ts} in grind



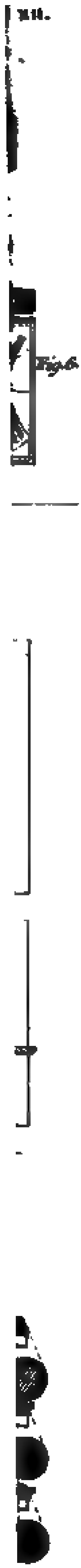
Wright



Nash's imp^{ts} in



W. Newton. del.



t Sc.

Dodds' treating iron & stamp^d envelope machine.

Fig. 1.

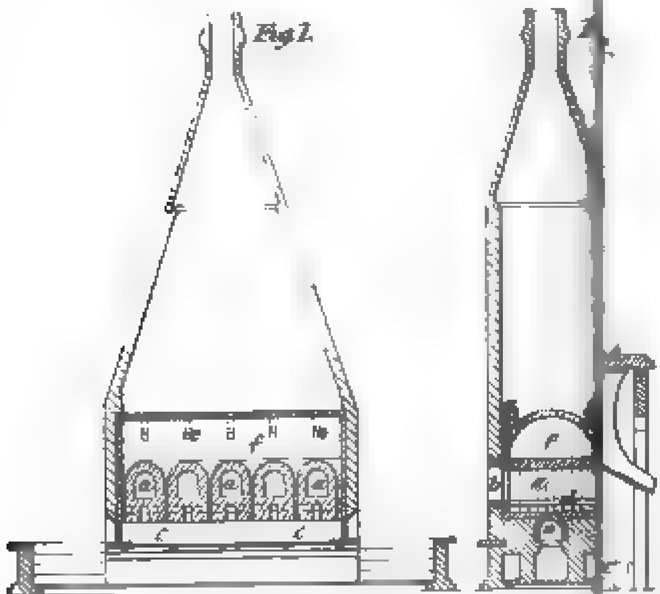


Fig. 7. Fig. 9. Fig. 8. Fig. 3. Fig. 4. Fig. 5. Fig. 6.

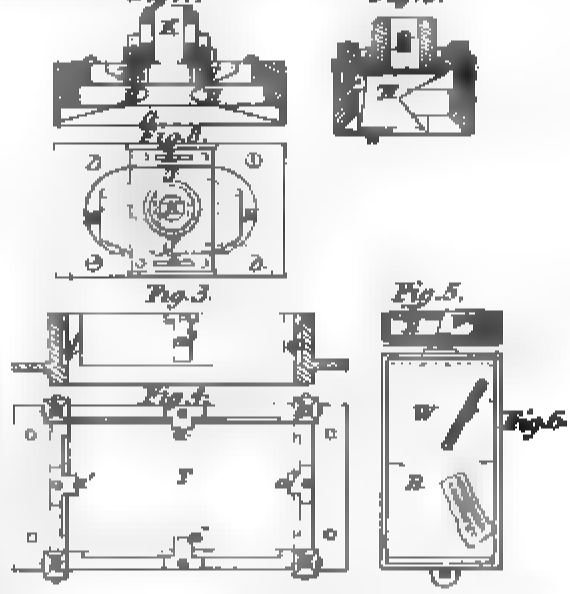
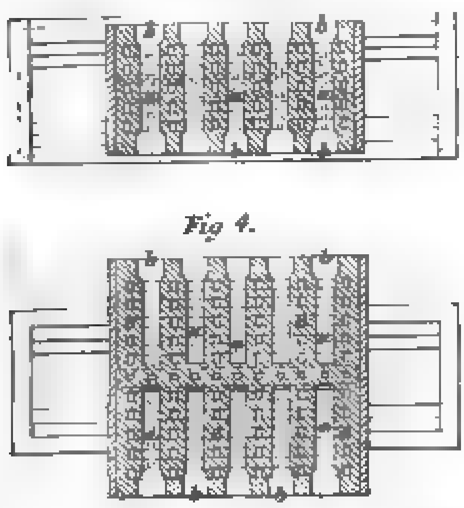


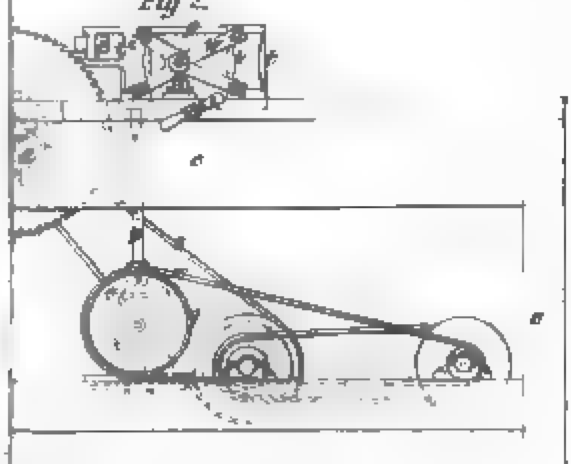
Fig. 3.

Fig. 4.



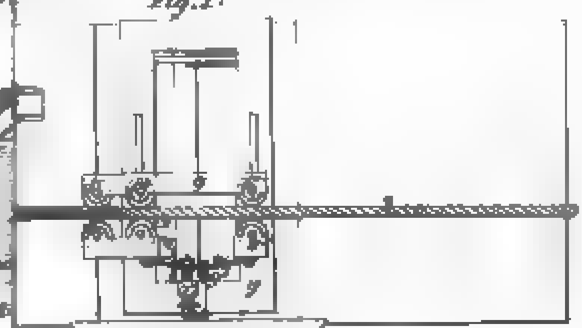
d sewing mach^y.

Fig. 2.

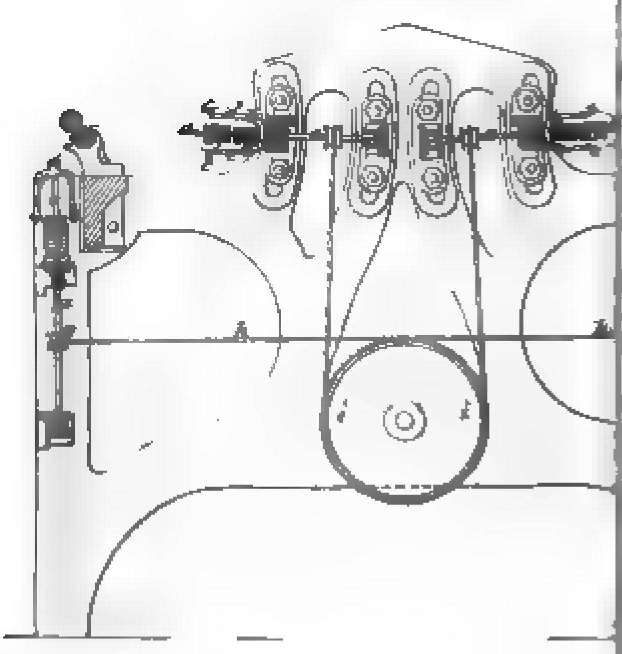


Lister's imp^ts in washing woo

Fig. 1.

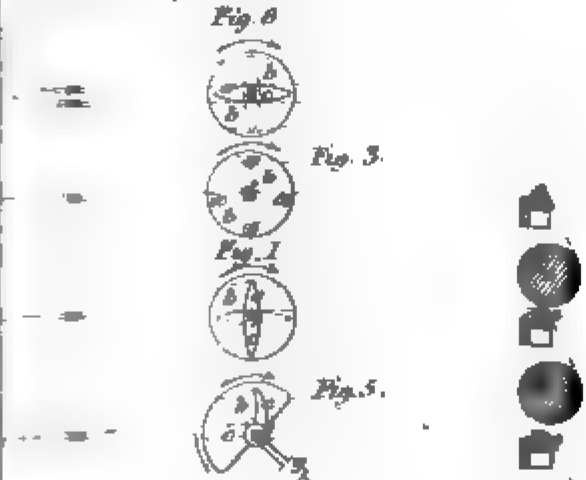


Mowbray's imp^d spinning m



hnson's imp^ts in looms

Fig. 6. Fig. 3. Fig. 1. Fig. 5.



W. Newton. del. T. Sherratt Sc.